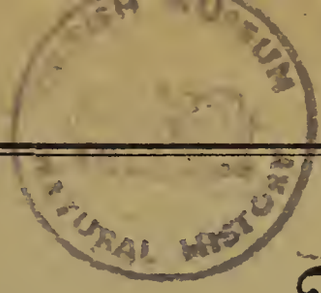

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FOR THE YEAR

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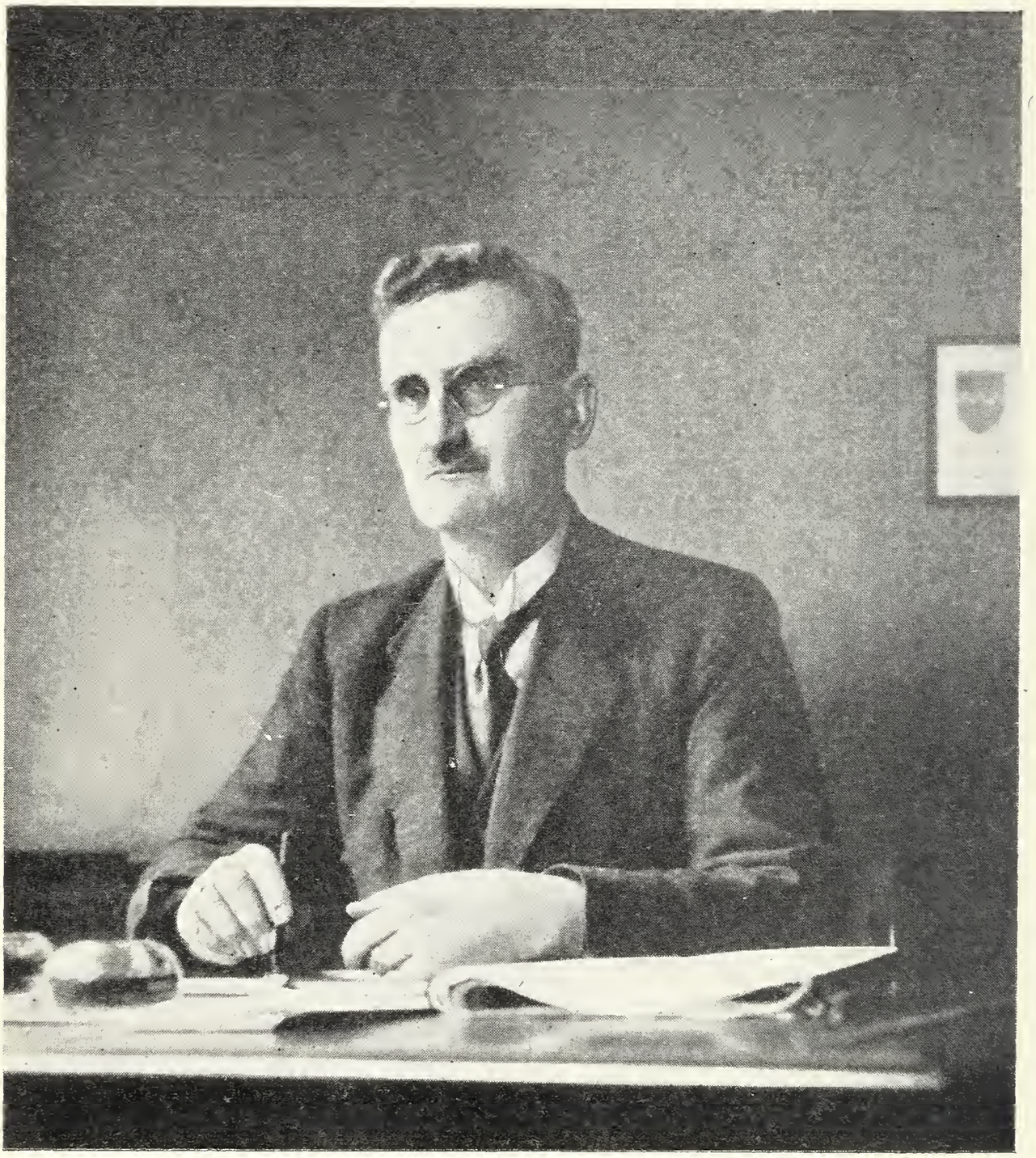

LAWRENCE GILBERT PAYNE.

THE LONDON NATURALIST.

No. 28 for the year 1948.

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Editorial.

THE portrait of our late president, Mr L. G. Payne, appears this year as the frontispiece to the *London Naturalist*. His death on 10th March 1949 was indeed a serious loss to the Society as a whole and to his many friends among the members. It was felt that members would wish that this number of the *London Naturalist* should commemorate his death although this did not occur in 1948. An obituary notice appears on page 124. The second part of " The Story of our Society " by Mr Payne appears on page 10. The two parts are bound together as a reprint, and form both a valuable record of the Society's past and a fitting memorial to one of its most devoted servants.

The Editor has heard the complaint that many of the papers in the *London Naturalist* are of interest only to a limited number of specialists and are unreadable to most of the members. He is confident that this year at least there is a fair balance between papers for the specialist and papers of general interest. Besides " The Story of our Society," this number contains an address given by the Honorary President of the Society, and a paper on " Ecological Aims and Methods for Amateurs " by Dr O. W. Richards. Our knowledge of the fauna of the London area is extended by papers by Miss Longfield on the Dragonflies and by Mr Fitter on the Mammals. The Botanical and Ecological sections have also made their usual contributions.

The Editor would welcome more papers from other sections, and more short notes and observations from members.

All papers intended for publication in the *London Naturalist* should be submitted in the first place to the Secretary of the appropriate section and not directly to the Editor. It would assist the Editor in his efforts to achieve earlier publication if sectional Secretaries and intending contributors would aim at completing at least the first draft of their papers by the end of the year.

Honorary President's Address, February 3, 1948

By Professor M. Greenwood, D.Sc., F.R.S., F.R.C.P.

The Debt of Natural Knowledge to the Amateur.

A FEW months ago, the Council of this Society conferred on me a great distinction—they added my name to the roll of Honorary Presidents. I shall not waste time in confessing my unworthiness of the honour; even when an audience thinks such a confession true, it doubts whether it is sincere because most men are vain; I will only say your Council gave me pleasure and roused in me a desire to thank you personally; but if you feel that I am, as an old saying has it, bringing you brass in exchange for gold, you will forgive me.

I became a member of the North London Natural History Society in 1899 and am far from being its senior surviving member; but 1899 was nearly fifty years ago and the world has seen more changes between 1899 and 1948 than between 1850 and 1899. Then the Society met in the Sigdon Road Board School—as it was then called. On my visits to the London School of Hygiene, which are still frequent, I pass the old meeting place; it suffered bomb damage, has not yet been re-conditioned, and stands silent, dishevelled, ugly, a relic of late Victorian England; but I look at it with a thankful heart. I remember my first attendance there, the guest of my sponsor, Millais Culpin. Prout, Robbins and Bacot all, I think, made short communications on natural history topics. In 1899* most of the members, less than 100, all those with whom I came into close touch were amateurs, by which I mean their scientific studies were pursued in leisure time and because the studies interested them. Most of these amateurs had had no university or technical college training in biology; what they knew they had taught themselves. It may be that even now a large proportion, a majority of the members of this great Society, are amateurs in the sense of my definition. But very many of these amateurs have been trained in the methods of biology at secondary schools, technical colleges or universities. I was a Merchant Taylor, on the modern side; we were taught some chemistry and physics but no biology; we did not even have a Natural History Society. The Grocers did; that School Society was the ancestor of the North London Natural History Society. I do not think that either of the two amateurs upon whose careers I wish to say something, Arthur William Bacot and Louis Beethoven Prout, had any biological training at school. It may well be that both had at first, in childhood, no more than the urge to collect things, whether stamps, cigarette cards, plants or butterflies, which is natural. I think—it is a mere unskilled opinion—that the advantage a child attracted by plants or insects has over the child who collects

*The earliest printed list of members, 1905, has 76 members and 27 associates. None, I think, professional biologists.

stamps is that, if he is of the right stuff, the collecting tends to wider interests.

The famous mathematician, Professor G. H. Hardy, said (see *A Mathematician's Apology*, Cambridge, 1940) that the kind of intellectual skill which enabled a man to compose or solve a difficult chess problem was genuinely mathematical but that making chess problems was trivial mathematics, because it did not lead anywhere except to the making of other chess problems. I should say that a child whose stamp collecting grows with his growth does acquire training in accurate observation, the recognition of minute differences, their classification, just as does the child who develops from collector to naturalist. But the philatelist's field remains limited to something narrow and artificial. The naturalist's field is all of God's universe. The very great man of science who is no longer, alas, your Honorary President told us some years ago how his scientific interest began (he was an amateur, like Arthur Bacot, employed in the city) in butterfly collecting and that one of his earliest, I think the earliest, of his biochemical papers was on a pigment of the butterfly's wing. The name of Hopkins will no doubt be remembered a century hence by more people than the names of Bacot and Prout, because Hopkins' field of research was wider, more fertile of results immediately applicable to the needs of man. But the names of Bacot and Prout are as well assured of immortality, because there will always be *some* men of science interested in what interested them. I am not enough of an entomologist to appraise Prout's life work; those who have the right to do so assure me that no other man had so wide and accurate a knowledge of the geometrid moths, that as taxonomist, morphologist and naturalist, this professional teacher of the theory of music was one of the masters of natural knowledge.

Of Arthur Bacot's technical entomological skill I cannot speak any more expertly than of Prout's, but for 20 years he was my most intimate friend, an elder and beloved brother, and for nearly 10 years a scientific colleague, so at least I can speak of *him* with knowledge. In the Society's Library will be found notices of Bacot's life and work by various hands. I do not propose to summarise them or to speak of the beauty of his character or the fineness of his intellect. My emotional reaction when the name of Bacot is mentioned is nearly as intense and painful now as it was on 13th April 1922 when the news of his death was telephoned to me; it is almost as unpleasant to the audience as to the speaker when the speaker breaks down. There are, however, some personal matters relevant to my theme and not emotionally changed which should be discussed.

Bacot's preliminary training for research was not merely inferior to what a youth of equal promise and no greater pecuniary advantages would enjoy now as a matter of course; it was inferior to what was available in his own day and in his own school; because Bacot was a delicate child and often away from school. He left school with no reading knowledge of any foreign language, and little knowledge of chemistry and physics; of mathematics he had—to use the phrase of another

amateur of whom I shall shortly speak—his shop arithmetic. Suppose then that fate had been kinder, young Bacot's health stronger, his parents' means ampler, would the *schooltime acquisitions* which he lacked have enabled him to find himself more quickly? I limit the question strictly to acquisitions; obviously had he been vouchsafed greater leisure, as the young Darwin and the young Galton were vouchsafed, the answer is not doubtful. But, in spite of the saying that all knowledge is power, I do *not* feel sure that if Bacot had been in the colloquial sense a better educated man, he would have been a greater biologist. Some members of the profession of which I am, legally speaking, a member, have doubted whether the system of training which, at any rate 50 years ago, rigidly segregated medical students from contact with patients, confined them to the study of "Basal Sciences" for years, was wholly wise. Of course, the arguments in favour of the old system had force. How can one appreciate the abnormal, the pathological, unless one has knowledge of the normal, the physiological? Can one hope to understand the complex chemical and physical problems of living creatures without a training in the simpler, or apparently simpler, chemistry and physics of inorganic substances? So, it may be said, the lad who has taken a course of elementary biology in a laboratory, will look upon the field problems of the naturalist more wisely than the youth who began as a mere collector. I think that may, statistically speaking, be true, but I am not sure. In a biological laboratory of 50 years ago—the age of types—amoeba, earthworm, crayfish, amphioxus, frog, dogfish, etc.—one studied not life but what had lived; it is true that the collector was a killer, but he had seen these creatures in their life and beauty and, if he bred moths, he saw life developing. The biological student did not keep amphioxus as a pet or study the loves of crayfish. It is true enough that laboratory work under a good teacher will give a neat fingered lad a dexterity, a technique, which will be invaluable; even a Bacot, without a teacher, may lose time; but a really able man learns much from his own mistakes. In fact, when, towards the end of his life, Bacot did have command of first-rate laboratory tools and gadgets he was as dexterous as men who had lived all their working lives in well-equipped departments. After all it is an emotion which quickens study; interest in, perhaps love of the objects of study. The author of a famous text-book of algebra (Chrystal) gave the reader this advice:—"When you come on a hard or dreary passage, pass it over; and come back to it after you have seen its importance or found the need for it further on." It was good advice. The amateur who studies something because it interests him may be discouraged if he is assured that it is no use studying it until he has learned something else first. The assurance may be wrong (it often is), if it is right, he will discover its truth for himself and then will be interested in the required preparation, or will set his teeth and learn what must be learned, having convinced himself of its need. Let me tell you the story of another amateur, a Londoner, like Arthur Bacot, but of the 17th not the 19th century, John Graunt, the pioneer of Vital

and Medical Statistics. Speaking in 1948, I do not need to apologise for speaking of vital statistics to a Natural History Society. Ecology, the research tool of which is statistical, is an important, an academically respectable branch of Biology, and it is not only a veteran of statistics like me who takes pleasure in the numerous arithmetical statements our fellow member, Mr Fitter, has included in his charming book (*London's Natural History*, by R. S. R. Fitter (Collins)). I note with pleasure how prominent Ecology is in our current syllabus, and I am sure Dr Tucker had a more appreciative audience for his excellent paper than I had about 40 years ago for a paper on statistical correlation.

Rather more than 400 years ago the Lords of the Council issued an order to all the parish clerks of London to make a weekly return of the numbers buried each week in London, distinguishing those who died of the plague. One of the first of these returns or bills of mortality has survived. It is quite short and begins:—

"Since the 17th day of November unto the 23rd day of the same month, the dead within the city and freedom, young and old these many following of the plague and other diseases. Imprimis Benetts Gracechurch 1 of the plague, St Buttols in front of Bishops Gate 1 corpse (and so on through the parishes, with a sum) of the plague 34 persons and sum of other sicknesses 32."

That was in 1532; one may be sure that the enumeration of other sicknesses was incomplete but the object of the order was not to discover a death rate, but to obtain information whether the plague was epidemic. Our ancestors believed that the plague was due to a corruption of the atmosphere. Their belief was wholly incorrect—after all, it was nearly 400 years before field workers surmised and Liston Martin and Bacot proved that plague was spread by flea bites and how they spread it—but the inference our ancestors drew from the false doctrine, viz., that when plague was epidemic in a town the best thing to do was to go somewhere else as quickly as possible, was quite correct. From the point of view of the public health it was not a practically useful inference because only very important people who did not have to earn a living could go anywhere else, but it would not be of much use even to these happy few unless they were warned. Hence the order. At first the order was only enforced when plague *was* about, but, as so often happens in our country, when an order is given, we grumble about the trouble it involves, then are reconciled and just go on with it. Indeed, the London Bills continued to be issued for more than 300 years, although before they were discontinued, a nation-wide system of vital and medical statistics had been introduced. By the end of the 16th century, the bills had been enlarged. Sexes were distinguished (not ages) and causes of death. The way this was done was as follows. When a death was reported to the parish clerk, an old woman, called a sworn searcher, of the great family of Sarie Gamp, went to the house where the corpse lay; looked at it; no doubt asked relations what the apothecary had said and then, after a glass of ale,

trotted back to the parish clerk and told him what she remembered. So, by the time our amateur statistician, John Graunt, interested himself in the subject more than 80 years' records were available for inspection. John Graunt was a city shopkeeper—he had a mercery and haberdashery in St Paul's Churchyard and was a member of the court of common council, and, like John Gilpin, a captain of the Train Band, our Honourable Artillery Company. His friends, who included Samuel Pepys, esteemed him highly. " He was," wrote Anthony Wood, " an ingenious and studious person, generally beloved, was a faithful friend, a great peace-maker, and one that had often been chosen for his prudence and justness as an arbitrator. But above all his excellent working head was much commended, and rather for this reason, that it was for the public good of learning, which is very rare in a trader or mechanic." Wood—who was a bit of an academic snob, as the last words of the quotation imply—must have been greatly impressed by what he had heard of John Graunt, because he appended his account of him to a notice of a totally different Grant, who was an Oxford man. The famous gossip, Aubrey, who did know our Graunt, said, " His death was lamented by all good men that had the happiness to know him." I like to think that John Graunt resembled Arthur Bacot in more ways than one.

Graunt's attention was probably directed to the Bills of Mortality by a friend named William Petty, himself a keen statistician and, as the world reckons fame, a much more famous man than John Graunt, for, beginning life as a cabin boy, he died one of the richest men in England and his great-grandson was Prime Minister for a few months. The first edition of *Natural and Political Observations made upon the Bills of Mortality* was published early in 1662, a second in the same year; two other editions appeared in the author's lifetime; a fifth in 1676 (Graunt died in 1674, at the same age as Arthur Bacot). The only modern reprint is in the two volume edition of the *Economic Writings* of Sir W. Petty, edited by Prof. C. H. Hull, of Cornell University (Cambridge University Press, 1899), a reasonably accessible book, in many public libraries. I hope you will read Graunt's little book for yourselves; it is a classic. I shall only make one quotation and that a single sentence, " We have found that of 100 quick Conceptions about 36 of them die before they be six years old."

Hundreds, indeed thousands, of years before John Graunt was born, mankind knew that the lives of little children were fragile; but John Graunt was the first man to measure the risk. His 36% was not a guess, it was an arithmetical inference and, as I shall try to convince you shortly, it was very nearly correct. But, as he did not know the ages at death of those who died, how could he make *any* calculation? The answer is by the use of a quality sometimes called common sense (a better name is genius) and what he called his shop arithmetic. There is a proverb that we should not make the best the enemy of the good. Many people do; especially learned people. In and before John Graunt's time, physicians were learned men—much more book-learned

than physicians are now—not one of them deigned to consider seriously the Bills of Mortality. What should old women who could not read and write know of causes of death; even if they did hear what the apothecary had said, he did not amount to much. John Graunt, who had never walked a hospital or read Galen, had not these inhibitions. His common sense suggested to him that a good many of the causes of death set down in the Bills must have been causes which affected only little children. For instance, of 229,250 deaths in 20 years, 32,106 were assigned to Chrisoms and Infants, 14,236 to teething and worms. Those totals must have related to little children. So he worked through the data, and reached a sum which he assigned to children under six. The total he reached for a period of 20 years (1629-36 and 1647-1658) was 77,229. Now the total number of deaths at all ages for the 20 years was 229,250, from these he subtracted 16,000 deaths due to plague; 77,229 is 36% of the remainder, 213,250. Those of you who take an interest in statistics may shake your heads and say that what Graunt ought to have done was not to take the ratio of the deaths under 6 to the total of deaths at all ages, but the ratio to the population living at ages from 0 to 6 years; and you would be right. But then Graunt did not know the age constitution of the living population. As you may know, under very exceptional conditions we can reach a measure of mortality when we do not know directly the age distribution of the living population. If we have a population so constituted that, year after year, the annual live births are equal in number to the annual deaths, if there is no immigration or emigration, and if the rates of mortality at ages do not change from calendar year to calendar year, then what Graunt did would be quite legitimate. But the " ifs " are numerous and it is certain that the conditions were not fulfilled in London. Indeed, Graunt knew they were not fulfilled. London was growing and its growth was not due to natural increase, viz., an excess of births over deaths, but to migration from the rural districts. It is, perhaps, the last-mentioned fact which led Graunt to think that his result might not be far wrong. If a population is growing rapidly by natural increase, the method Graunt used would greatly exaggerate the rate of mortality in childhood. If, however, its growth were due to migration at older ages, this does not follow. But I do not wish to bore those who, unlike me, dislike doing sums. Personally, I think Graunt was right for the following reasons.

Some people have supposed that London in the 18th and early 19th century was a healthier place than in the 17th century. The dreaded Plague had gone and, after the fire of 1666, a great many of the wooden houses were gone. Those who have attended to the sanitary history of London do not share that opinion; mortality in childhood certainly did not improve at all during the first half of the 19th century, and there is not much evidence of improvement in the 18th century of general mortality except towards the end of the century. More than 70 years ago the famous Dr Farr constructed a Life Table for London, based on the mortality experience of London rather more than 200 years later

than Graunt's work. Thanks partly to Graunt himself, Farr had much better material than the old pioneer. He did know the age distribution of the living population, he did not have to guess ages at death and his life table is therefore trustworthy. And what proportion of Quick Conceptions perished before attaining the age of six, in the London in which not picturesque people like Mr Pepys and glorious John Dryden but our own rather drab grandfathers and fathers lived and worked? The answer is 32%. The shop arithmetic of John Graunt, his 36%, was not a bad approximation to the horrible truth. The times in which we live do not encourage optimism, but the little children of bombed, dirty, rationed London are not sacrificed at the rate which within living memory was regarded as normal.

I dare say I have dwelt too long on the doings of my amateur of statistics; you must forgive the garrulity of an old statistician and give me leave to say that there is plenty of scope for the amateur statistician in Natural History. I dare say many members have read a charming little book by Mr Lack on *Erithacus rubecula*. Of course, the most exciting of his discoveries was psychological, that when Robin seemed to love us, he really did no such thing; but Mr Lack had some vital statistics of robins and I should have liked more. For nearly 20 years the late Prof. W. Topley and I collaborated in a research on experimental epidemiology. The idea was to introduce a bacterial infection into a herd of mice and watch what happened. I shall resist the temptation to discuss the results, some of which were biologically interesting, but may at least dwell upon a weakness we could not overcome—ignorance. How little we knew of mice. Learning from our own mistakes we could, and did, create an environment in which mice could live and, in a sense, prosper. But how artificial the existence! How utterly unlike the natural state! How dangerous to infer from our experience in Mallet Street, W.C.1, what would happen to infected mice in nature! I think our bird watchers are our best vital statisticians of natural communities yet and only wish all naturalists would do shop arithmetic as John Graunt did. *Only* amateurs will do it; it is a kind of research which does not bring quick returns. John Graunt had been in his grave two hundred years before what he taught us about human ecology was heeded.

About the time I joined this Society, I attended the lectures of Dr Leonard Hill, now Sir Leonard Hill, full of years and honours. I remember how he told us the story of the Italian physiologist, Galvani, who, interested in the irritability of animal tissue, had the curiosity to know whether an approaching thunderstorm would affect the muscle of a frog. So he took the thigh muscle of a freshly-killed frog and suspended it by a steel pin from a copper wire (perhaps his wife's washing line) in the garden and sat down to watch events. The breeze before the storm swayed the hook and when the muscle touched the line it twitched and—but I need not go on, you all know an epoch-making discovery had been made. What I did want to recall was our teacher's moral:—" Remember that, gentlemen, when you come upon somebody

intent on doing an experiment and he can give you no better reason than that it interests him; before you jeer at him, remember Galvani. If somebody passing his cottage on the way to the Pub had asked him what he was doing, and when told asked what on earth it mattered whether the thunder affected the frog's muscle or not, he could only have said it interested him. That was all, but he made one of the very great discoveries in the history of science."

That is the utilitarian case for amateurs; it is a very strong case; but, in my submission, there is a stronger case. I have never cared for the proverb that honesty is the best policy; I dare say it is, statistically speaking, true, but even were it not I should still think that honesty was right and that because right is right to follow right were wisdom in the scorn of consequence. I think the amateur attains a happiness vouchsafed few. Blessed are the pure in heart for they shall see God. That is the reward of the great amateur, the John Graunt or Arthur Bacot: it is given to them to see truth.

President's Address, December 7, 1948.

By L. G. Payne, F.Z.S.

The Story of Our Society. Part II.

IN my address a year ago I told you something of the "Story of Our Society" from its inception in 1858, when a few men met together in a room above licensed premises in Haggerston, up to the time in January 1914, when the City of London Entomological and Natural History Society amalgamated with the North London Natural History Society to form our present London Natural History Society. That event seemed to mark the end of an old era, and the beginning of a new, and therefore a suitable place to make a pause. It is my present purpose to continue the story of our Society onward from that point to the end of the second world war. I feel, however, that much of the reported success of my address in 1947 was due to the setting of the scene, and the general Victorian background, and, if I may say so, to the literary opportunity provided by the romantic appeal of a bygone age.

In those far-off days, ordinary people and ordinary events seen through the spectacles of to-day assume perhaps an air of unreality and quaintness greater than they deserve. My story to-night must in the nature of things be more prosaic, more commonplace, because the principal players and events in the scene are more nearly our own types and contemporaries. It is more difficult for me, in the period under review to-night, to gauge with accuracy the proportionate importance of events, and I must ask you to bear with me if I have unintentionally omitted in my chronicle events which should have been included.

On January 16th, 1914, the two ex-presidents of the amalgamated societies stood on the platform together and chatted reminiscently of the old societies.

At the Annual Exhibition held on February 3rd practically the whole of the exhibits were entomological. There were, however, a set of photographs of the Tufted Duck shown by Mr A. G. Hubbard. It was stated that the Tufted Duck's nest furnished the first record for the North London district.

The Ornithological excursion on June 6th, according to the syllabus, was for members only, and for two entomological excursions in the same year members had to apply to the secretary for details. One wonders if these were two different methods of discouraging visitors.

The subscription was maintained at 5/-. Chingford branch was meeting at the Avenue Café by Chingford station, and Woodford branch at the Sir Wilfred Lawson Hotel, Woodford Green.

At the end of the year part of the Council's report is as follows:— "The Council of the London Natural History Society wish to emphasize that the amalgamation of the societies has already been completely justified. They desire to assert that it was well that the amalgamation was carried through a year ago since it has enabled the difficult circumstances created by the war to be met with a strength and resource that could not have been furnished by either of the old societies singly."

The Report continues, "in the early part of the year the meetings were well attended and entirely successful. Some of our members are now on active service, and some are doing duty as special constables. Consequently the attendance at meetings in the autumn was not so good as it was earlier in the year, but this was unavoidable for your Council have learnt with pleasure that Society members answered promptly to the call for the protection and service of the Homeland in the hour of peril."

In this year, following on the amalgamation it was decided to subdivide the area south of the Thames into twelve sections and so complete the circle of the Society's area.

In the *Transactions* there was a 20-page article on British Breeding Ducks by C. S. Meares.

Louis B. Prout was the first President of the London Natural History Society, and to commemorate the fusion, a reception and supper was held at the Palmerston Restaurant, M. Greenwood, Jun., M.R.C.S., L.R.C.P., presiding—now Professor Greenwood, our Honorary President. The Society continued to meet at Hall 20, Salisbury House.

In 1915 Dr Cockayne was President, the late Hugh Main gave a lecture, on "Ornithological Notes with a Camera," and Mr Dell became Treasurer. The same year the late A. W. Mera said "With our new partnership I fully believe there will be room for all true lovers of Nature and our sphere of knowledge will be greatly widened by meeting with specialists in so many other branches of natural history. As our worthy President, Dr E. A. Cockayne, is well known to both societies I feel confident that nothing will be left undone by him to assure the permanent success of our united Society."

The late Mr E. Kay Robinson, Editor of the *Countryside*, was elected a member.

Extract from the Council's Report: "Zeppelin raids have kept some members from attending meetings and at times have tended to shorten our proceedings."

Woodford branch report occupied a page of the *Transactions*; nine meetings with lectures were held. Of Chingford the report said "interest well maintained with nine lectures, all by Society members."

The late R. W. Robbins read a paper to the main Society on the Flora of Epping Forest, in the course of which he said, "about six years ago with another member of the Society I was in an out of the way corner of the wood not far from Epping and was delighted to find in a moist glade a grand clump of the uncommon Marsh Fern, *Lastrea thelypteris*, whose creeping roots had covered quite a large area . . . . this was quite new to us in the Forest." It is most interesting to read here corroboration of the fact that R.W.R. was the discoverer of this plant in the site where we all know it to-day.

The *Transactions* of the London Natural History Society for 1915 extended to 84 pages. Of the five printed papers two were botanical, two entomological and one archaeological.

A curiously phrased editorial paragraph relative to our *Transactions* of this year appears in *The Naturalist* of 1916, and, after reading it, one is left a little uncertain as to whether more blame or praise has been awarded. It reads thus: "While congratulating the Editor upon the excellent reports and upon the general appearance of the *Transactions* we should like to make a mild protest against the method of numbering the pages containing advertisements . . . . the system of introducing paged advertisements in the text is vile."

In 1916 the Plant Galls Committee was formed under Mr H. J. Burkill as secretary.

The *Transactions* reproduced an excellent photograph "Nest of Montagu's Harrier from a Norfolk marsh" marked "Copyright, P. J. Hanson."

The branch at Woodford which had owed so much to the enterprise and enthusiasm of Mr C. L. Collenette ceased to function this year, and the following notice was inserted in the *Transactions*: "The branch at Woodford has suspended the holding of meetings. Many members were of military age, and their enlistment, and the absorption of others in work arising from war conditions so reduced the numbers attending meetings that it became inadvisable to continue."

Of Chingford it was written: "Chingford branch, with Canon Russell as chairman, and Mr Samuelson as secretary, has held successful and encouraging meetings despite the adverse circumstances."

There was also printed the first of what was to be "An Annual Report on the Birds of Epping Forest." There was also a complete index of all the insects, plants, birds, etc., referred to in the text of the *Transactions*—a practice which some, including myself, might like to see revived.

In 1917 the Research Committees of preceding years gave place to the Sections as we now know them.

In 1918 the Society moved to Winchester House, Old Broad Street. A. W. Bacot read an important paper on mosquitoes and the risk of malaria in England.

On Armistice Day, 1918, C. S. Nicholson died. He bequeathed to the Society a large number of valuable botanical and ornithological books, a large collection of birds' eggs in three cabinets, and a very fine collection of British plants in a large herbarium.

The first World War was over and the Society's membership had dwindled to 127.

In 1919 £36 was received in subscriptions, £21 paid in rent, and £25 for printing. Special donations towards the printing totalled £16.

In 1920 the late R. W. Robbins became president, which office he had held in the North London Natural History Society twenty-two years previously.

In his Address he said: "I should feel it a misuse of language to call myself a scientist, but if a love of Nature and a keen pleasure in observing and studying natural history in many branches, and acquiring a working knowledge of the phenomena displayed, makes a Naturalist, to that title I may fairly lay claim." He further said: " . . . I propose to speak of natural history rather as a hobby, a mental and physical refreshment, than as a pursuit demanding lifelong devotion and full concentration of our powers. To the great majority of us the necessity of earning our living makes such devotion impossible, even if we feel ourselves otherwise equipped for the task." I commend this Address to your re-reading.

The Entomological Section, which had been showing signs of flagging, now appeared in the syllabus with a much improved programme with monthly exhibitions and discussions on defined species.

In 1921 our annual publication first became known as the *London Naturalist*. It contained a valuable paper of 59 pages by Dr Cockayne, entitled "Structural Abnormalities in Lepidoptera." In the syllabus occurs "Notes on Eastbourne" by C. Nicholson, and under this is specially printed "The lecturer requests that members will not smoke." The annual subscription became 7/6.

1922. An eventful year so far as your retiring President was concerned. My wife and I were on a botanical holiday at Swanage. One day we saw coming towards us a lady and gentleman, both carrying vasculums, as were we. We looked at each other but did not speak. The next day we saw them again. We spoke. The gentleman was Mr E. B. Bishop, then President of this Society. The lady was Mrs Wilde, his sister, also an active member. We chatted of the gentians and other plants of Studland Marshes. He told me about the London Natural History Society and proposed me for membership the following month. The Library was little used, I believe. Did I receive a wrong impression when I state that the Librarian of that year registered an expression of surprised annoyance when I asked if I could see a book? Why does that memory still remain after 26 years?

Mr Bishop's Address that year was entitled "The Extreme Localness of Certain Species." Chingford branch had a microscope evening of which it was reported: "There was a good show of microscopes and a poor show of members."

There was a botanical week-end at Birling, North Kent, when *Orchis purpurea*, the Great Brown-winged Orchis, was seen. I do not know if it still occurs there.

The birds of Epping Forest were still occupying the full attention of the Ornithological Section, for the seventh annual report was published this year.

Arthur William Bacot died on April 12th, 1922, six months before I joined the Society. I did not know him, but his inspiration and example have been so great on our older members that I must do more than briefly refer to him in this chronicle of events. The following details have been extracted from an article entitled "The Life and Scientific Work of Arthur William Bacot" by Major Greenwood and J. A. Arkwright, published in *The Journal of Hygiene*, March 1924.

A. W. Bacot was born in 1866 and started butterfly hunting at the age of 5, and at 6 was saddened by his kindergarten mistress's ignorance of butterflies and caterpillars. At 16 he commenced work in a City office and remained in that employment for 27 years.

"It would not be easy," says his biographer, "to imagine external conditions less propitious for the development of scientific ability," but between 1893 and 1909 he published more than 50 separate papers and contributed largely to Tutt's monumental treatise on the British Lepidoptera. From the date of his first publication to his initiation to medical entomology Bacot's interests were balanced between morphological and genetic research. From the former he acquired a technical dexterity in the manipulation of small objects and a power of exact description which were to prove of great value in his later career.

In 1908, following his introduction to Professor Leonard Hill and Professor Bullock, Bacot gave an account of his breeding experiments with the geometrid moth *Acidalia*, to the London Hospital Medical College. This would appear to have marked the turning point in his career. Professor Greenwood was on the staff of the Lister Institute, and the Advisory Committee for Plague Investigation. This Committee was looking for someone who could study the rat flea from aspects other than the morphological, and Professor Greenwood formed the vital link between Bacot and the Committee.

The gulf between the certificated professional and the amateur is not so wide in England as elsewhere, still it exists. Obviously no committee administering public funds could have been expected to invite a man of 44, whose name was unknown outside a narrow circle, to throw up his means of livelihood and become a wholetime investigator. All that could be done was to invite Bacot to take up the study of fleas in his spare time, the Committee to bear all expenses and pay an honorarium. The terms were liberal, but Bacot feared that time was lacking. However, he accepted the proposal, an R.A.M.C. reservist was sent to

Loughton and with his help Bacot turned a derelict stable into a laboratory, collected some apparatus and a few fleas and set to work.

The time at his disposal was from seven in the evening to eight o'clock in the morning, five days a week, five hours more on Saturdays, and, says Professor Greenwood, "such part of Sundays as I could not induce him to devote to forest walks."

The task set by the Advisory Committee was fully and completely carried out. Bacot's name was made, he was admitted to the select circle of recognised research workers, and was appointed entomologist to the Lister Institute of Preventive Medicine.

The 2½ years ending August 1914 were a time of perfect happiness for Bacot. For the first time in his life he had command of good tools, including a Zeiss binocular dissecting microscope.

During this period Bacot was maintaining various strains of fleas and lice, and even less pleasant creatures, for research purposes, Professor Greenwood referring to them as "Bacot's pets" and relating, how, on one occasion, when they had proceeded 10 miles on a day's cycling tour, Bacot suddenly remembered that he had left a box of lice on his drawing room table which would surely perish if unfed, so they both had to return the 10 miles (and it was a very hot day) in order that the lice might be suitably nourished.

Early in 1914 Bacot was appointed to British West Africa on the Yellow Fever Commission. In 1916-17, after his return from West Africa, he continued his researches for the Army Medical Department and made far-reaching discoveries affecting the inter-relation of lice with Trench Fever and Typhus. Such was his interest and enthusiasm, and spirit of self-negation, that, to quote his biographer's words again, he, that is Bacot, "with unfailing regularity provided fresh stocks as required, carefully graded as to age, fed and reared on his own blood and under definitely known conditions."

In 1921 Bacot went to Egypt to investigate some of the obscurities connected with typhus. Directly due to his researches he became ill through contact with infected lice, and, despite all care, he died on 12th April 1922.

The London Natural History Society is proud of its member Arthur William Bacot. He gave many long years active service to the Society and in turn derived inspiration and enthusiasm from the Society.

In memoriam, the Council adopted the following resolution: "To perpetuate the memory of our distinguished late colleague, Mr A. W. Bacot, the second meeting in April shall be dedicated to that purpose. The meeting will be described annually on the syllabus as 'The Bacot Memorial Evening'." That meeting was held regularly up to the beginning of the second World War. It commenced always with lights dimmed for the screen photograph of Bacot. His life story was then briefly recounted by one who knew him and the lecture which followed was always of outstanding merit.

In 1923 the *London Naturalist* contained an authoritative paper by Professor Greenwood, entitled "The Medico-Entomological Researches of Arthur William Bacot."

In 1924 the Society held a Dinner at the Ship Restaurant, Whitehall.

This year appears to have seen the heyday of the Archaeological Section; there were four excursions in the first half-year, including one week-end.

It would appear that the *London Naturalist* of 1924 has recently become of outstanding value, for it possesses an excellent photograph of something which is now lost. This was a reproduction of what it described as "the earliest existing page in the history of the Society." It is from the first Minute Book of the Society, dated July 1858 to June 1859. It reads thus: "Meeting, July 29, 1858. Messrs Healy and Killingback proposed that the Minutes be confirmed—carried." Clearly there had been a previous meeting and a very faint line above reads: "Mr Gates, who had been collecting *P. corydon*" . . . obviously the end of a sentence.

I deeply regret to say that this priceless Society relic is now missing, despite most careful search, though I personally handled the book in the first or second year of the late war. It was then in one of our cupboards with other Society records. It is a loss which can never be replaced.

1925 saw the inauguration of the Ramblers Section and the commencement of a 3-year tenancy of the office of President by Mr S. Austin.

Mr C. L. Collenette produced his book, *Sea Girt Jungles*, illustrated by photographs taken by himself and Miss Longfield. It was a record of the St George Expedition to the Pacific, including the Galapagos Islands. Two other well-reviewed books appear this year written by active members of the Society—*Exploring England*, by C. S. Bayne, and *How to look at Old Churches*, by H. S. Stowell.

The *London Naturalist* contained an interesting personal ornithological diary of London Birds compiled by A. Holte Macpherson.

1926 saw an innovation. The Botanical Section in the Syllabus published its first specialised objective. This was for *Leucojum aestivum*. Always previously it had been the policy of the Section merely to give place names for an excursion—any rare plant which it was hoped to see was treated strictly on a hush-hush basis. The new policy was adopted with much misgiving, but I do not think the section has ever had occasion to regret the innovation.

In 1927 Lord Grey of Fallodon became first Honorary President. Part I was published in the *London Naturalist* of the Botanical Records of the London Area. The Ramblers Section had a long week-end at Whitchurch, and the present type syllabus with coloured semi-stiff cover appeared. Up to this year the syllabus had consisted of a 4-page double-sided leaflet 3″ × 4″. The syllabus announced that "Visitors introduced by members are welcome." Now we just print "Visitors are welcome."

In 1928 The Ornithological Records of the London Area occupied 26 pages of the *London Naturalist*. Spring and Autumn Exhibitions were held and a printed Library Catalogue was issued.

The Ornithological Section was rapidly expanding. The Section now possessed a General Secretary, a Field Meeting Secretary, a Reading Circle Secretary and a Bird Ringing Secretary. There was a lecture on the Oxford Bird Census by E. M. Nicholson.

In 1929 there was a Botanical week-end at Swallowfield for *Fritillaria* and a botanical section debate with the unwieldy title, " Are the artificial introduction of new species, and the formation of new localities for existing species of the British Flora justifiable?" I had the temerity to open the debate in the affirmative on that February evening 19 years ago and became quite unpopular in consequence. My opponent was the redoubtable E. B. Bishop.

The Presidential address by W. E. Glegg was entitled " The Birds of Middlesex since 1866," and in this year the same gifted ornithologist produced a *History of the Birds of Essex.* From the pen of Mr C. S. Bayne came *The Call of the Birds.*

The Council's Report for this year is unusually cheerful; 1929 was described as " a very successful year," and the Treasurer's Report noted that the Society's income had passed the £100 mark.

Mr Samuelson, secretary of the Chingford Branch for 17 years, resigned.

In 1930 the Society moved from the smoky atmosphere of Winchester House to the London School of Hygiene and Tropical Medicine, and in this year the Ornithological Section held its first all-night excursion to Hackhurst Downs. The Annual Dinner was held at the Holborn Restaurant on March 11th. Sir Andrew Balfour, and Mr H. W. Andrews, President of the South London Entomological and Natural History Society, were the guests of honour.

Arthur William Mera died in this year at the age of 81, and an excellent photograph appears in the *London Naturalist* of the year. For several years he was President of the City of London Society. In his obituary notice he was described as a lepidopterist of the Victorian era. Study his photograph—the obviously carefully careless pose, seated on a rustic seat, white beard, bowler hat, hands in pocket, heavy Victorian watch chain, turn-up trousers with the turn-ups turned down—a figure to study.

It was in this year that Mr Tremayne as President delivered his provocative and inspiring address, " The Unseen Will."

In 1931 R. W. Robbins recorded *Archangelica officinalis* as an interesting Thames-side casual. It is now a commonly accepted permanent inhabitant of this area. There was a lecture by Mr C. S. Bayne on " Humbug in Ornithology and Entomology," and there was a Botanical Excursion to Mr W. B. Cranfield's garden at Enfield. Mr Cranfield was a specialist in British Ferns, and I still have growing his type specimen of *Lastrea uliginosa* given me on that day.

In 1932 Miss C. E. Longfield accepted the office of President and her address was entitled " Nature Study through the Ages."

On April 11th one of our most brilliant younger members passed over. I refer to John Cuthbert Robbins, whose sudden death as the

result of a motor cycle accident cast a gloom over the whole Society. It seems incredible to me that 16½ years have passed since John Robbins spoke at our meetings. He was ever ready to join in discussion, to propound a theory, but always spoke slowly and made sure of his facts.

A happy example of planned co-operation is evidenced in the *London Naturalist* this year. The Botanical Section had a well-attended excursion to Swallowfield, where two or three marshy meadows of Fritillaries were in bloom for all to see. Excellent photographs were taken by Mr J. E. S. Dallas, the text was written by Mr H. Spooner and the whole appeared in the *London Naturalist*.

In the 1933 *London Naturalist* an unusual and valuable illustrated article was entitled " The Marks used by Swan Owners of London and Middlesex." It extended to 17 pages.

1934. In this year, as Botanical Curator, I was authorised to amalgamate the three Botanical Collections in our possession, i.e. The King, Nicholson, and L.N.H.S. district, and at my discretion to destroy damaged or worthless sheets. I completed this by 1937.

Mr C. L. Collenette's photograph of *Lastrea montana* in Richmond Park, in the *London Naturalist* for this year, puts on permanent record the existence of a disappearing species in that locality.

In 1935 the Ecological Section was formed, and perhaps the outstanding event of the year was the Bacot Memorial Meeting, when the late Professor Sir F. Gowland Hopkins delivered his lecture " The Naturalist in the Laboratory."

1936. The Editor's Notes in the *London Naturalist* for this year contains the following: " The Ornithological Records are published for the first time as a separate volume under the title of the *London Bird Report*."

It was in this year that the Ecological Sectional Meetings first appeared in the syllabus and the first indoor meeting was " An Introduction to Ecology " by L. Parmenter. The section carried out excellent pioneering work on Limpsfield Common under the resident leadership of the late R. W. Robbins, and the *London Naturalist* of 1936 and onwards devoted an increasing number of pages to this area.

In 1937 Ludwig Koch's *Songs of Wild Birds* first came to us at the Annual Exhibition on February 2nd, and in the *London Naturalist* appeared the reviews of those excellent books written by two of our very active members: Miss Longfield's *The Dragonflies of the British Isles* and Mr Collenette's *A History of Richmond Park*.

In 1938 some of the Ornithological Section's excursions were designated " specially recommended for beginners," a practice to which I note they have now returned. Perhaps other sections would note this for consideration.

The previous year I had been appointed Curator with five sectional sub-curators, the amalgamated Herbarium now consisted of 5000 sheets and my report for the year included the following: " Much intensive work is being carried on in the corridor on Tuesday evenings by a body of keen sub-curators during which time the ordinary meetings are be-

ing held upstairs. Three large tables are always in use and there is a friendly spirit of co-operation amongst the workers."

And so to Sunday, the 27th August 1939. I choose this day because after the lapse of years I can still gauge with some accuracy the unrest of the times. I was due to lead a botanical excursion on that day, but somehow such frivolity seemed out of gear. Householders had been officially enjoined to prepare a gas-proof room in every house. All my neighbours were constructing wooden shutters to cover their windows for had we not been assured that matchboarding over the windows would protect us all from bombs in the event of war? I, too, had windows that needed protection. It was almost with a guilty feeling that I led that excursion, but the event was successful, and *Lastrea cristata* was seen in some abundance by the brook on the Surrey-Berkshire border.

On to the 2nd September, when I, as Curator, received an S.O.S. letter from Mr Hornblower, our General Secretary, informing me that the Keppel Street authorities required the immediate removal of our bookcases and cupboards from the corridor in order that this could be converted into a gas-proof air-raid shelter. On the Saturday I got into touch with Messrs Parmenter, Banks and one other, and, early on that historic Sunday morning, September 4th, 1939, the four of us turned up at Keppel Street, and, by midday, had moved practically the whole of the Society's property into an adjoining room. At 11 a.m. Mr Oake, the Secretary of the London School of Hygiene, invited us to his private room to listen to Mr Chamberlain. We heard him announce that we were at war with Germany. Somewhere a siren sounded. We emerged from the private room—mysteriously the gas-proof curtains had fallen into position. The corridor was isolated. We looked at each other and each knew that an era had ended.

My memory of that Sunday morning nine years ago is very vivid to-night. A few of us had done all that could be done, and the future loomed uncertain and menacing. Secretary Hornblower wrote us a personal letter of thanks and I must quote the last sentence, typical as it was of his cheerful optimism. "Double cheerio to you, my good friend," he wrote, "keep a stout heart; happiness is as we think, so inspire happy thoughts for yourself and express them to others and we shall win in every sense."

A Council Meeting was held on September 12th when it was decided, with great reluctance, that meetings should be temporarily abandoned.

The Council's Report at the end of 1939 optimistically concluded with these words: "We now look forward to the time when normal activities may be resumed."

We certainly looked forward to that happy time, but none of us knew just how many long and unhappy years stretched ahead before that wish was to be fulfilled.

1940 naturally was a year of Society stagnation, of individual discomfort, or suffering, or damage, or worse. The average events of the year are still commonplace in memory, and may be summarised in a letter I received from Mr H. J. Burkill towards the close of the year.

He wrote: "Jerry has considerably handicapped me lately as our house is only uncomfortably habitable, and little evening work is possible when the only warm place is on top of the fireplace. We do not know when we shall get any windows repaired." My own tragedy occurred at the end of 1940, a few days after our shelter had been completed. We escaped personal injury.

In January 1940 a belated start was made with the syllabus, with a few fixtures timed between February and June. The following notice was printed on the cover: "The Council has decided to recommend indoor meetings once a month. It is hoped that members will support the venture wholeheartedly." The meetings were held on Saturdays, commencing 2.30 p.m., but by July the meetings were again at 6.30 on Tuesdays, according to the syllabus. Actually they again had to be abandoned for the last three months of the year.

Until the advent of intensified bombing in September 1940 it had been my practice to pay a visit every few weeks to our storage rooms at Keppel Street for the purpose of making a cursory examination of the Society's property. Occasionally one or two hardier spirits would turn up, and we would play hide and seek amongst the closely stacked bookcases, searching for some favoured volume. I fear that the correct practice of entering a borrowed book in the appropriate register may have fallen somewhat into disuse in those strenuous days.

It was particularly inspiring to receive on the morning after one of the worst Blitzkreig nights of the year, a letter from Mrs Parrinder, acting Ornithological Section Curator, asking permission to purchase 500 cards for the purpose of indexing the sectional exhibits. I thought such a spirit deserved every encouragement and promptly agreed to the very modest expenditure involved, namely, 4/-. This together with 2/- for moth balls were the only curating expenses for 1940.

In 1941 the two half-yearly syllabuses were issued but they merely detailed the Sectional Officers with a few Saturday meetings. In April, however, a single sheet was issued covering the year, and detailing eleven Field Meetings, all for general natural history, and with only three indoor meetings. Even this curtailed programme was only arranged with the greatest difficulty.

It was in this year that our collections and bookcases were returned to their original positions in the Corridor as the storage rooms were now required for other purposes—but shortly afterwards a bomb fell on our old meeting room on the ground floor, blast from which wrecked the glass, and wrenched the doors off nearly all our cases and cupboards. I was able to persuade Council that it was vital to have these repaired, and on January 10th, 1942, Council agreed to repairs which were duly carried out at a cost of £19 14/6.

On the 1st of August 1941 further gloom was cast over the Society by the passing of R. W. Robbins. It is difficult for me, in preparing a history of our Society, to assess at its correct value any one particular incident or event, therefore I cannot here say more than a few words about Randolph William Robbins. To half my audience it must seem strange that to the other half R.W.R. is hardly a name, while this second

half will say: "Who was this man Robbins?" I must therefore attempt to maintain a standard of proportion acceptable to all. Mr Robbins had been a most active member of our Society for 50 years. He was a man of the widest natural history knowledge. He had occupied, in turn, nearly all the offices of our Society, and his enthusiasm and ready assistance at all times endeared him to the many who were privileged to know him. I would refer you to the 9-page obituary in the *London Naturalist* of 1941.

1942. Another difficult year. The syllabus for the first half-year shows 13 field meetings, 6 of which were for the Bookham Survey. By contrast, the corresponding six months syllabus for this year, 1948, shows 78 field meetings. And on those Bookham Sundays of the war years I must pause a moment. A railway carriage of Society enthusiasts once a month—news of absentees—letters shared from distant members —sirens on and off—distant thuds—monthly teas in the drawing room of the private house on the edge of the Common where all members removed their boots for fear of soiling the carpet—co-operative natural history with perhaps that sense of temporary escapism which braced one for the next few days.

This year, too, saw the commencement of the Epping Forest Survey, centreing on the Cuckoo Pits, which area was thoroughly worked through the later war years.

It was in 1942 that our member, Mr M. T. Hindson, volunteered to go to Keppel Street in daylight hours, to tidy up and put in order the Library which, in every sense, had fallen on dusty days. I pay tribute to a job of work well done.

In September of that year I obtained permission from the Keppel Street authorities for the use of the Corridor on the 1st Tuesdays monthly for the purpose of curating, and restricted use of the Library. The Corridor was but dimly lit, it was cold, it was entirely cheerless, there was no possible encouragement for anyone to turn up, but there was always one person—a lady—who could be depended on. This lady was working carefully through the bird skins on every possible occasion, and I wish here to pay tribute to Miss McEwen for her services in that capacity.

In October 1942 Mr J. E. Lousley agreed to become Botanical Recorder.

By the end of the year black-out and other conditions made any kind of evening meeting difficult; thus the notice sent out convening a Council Meeting for November 18th, 1942, contained these words: "An evening meeting has been arranged when there is good moonlight in the hope that more will be able to attend."

In 1943, largely through the energy and enthusiasm of Mr C. P. Castell and Mr L. J. Tremayne, a Nature Reserves Investigation Committee was formed, in conjunction with Chingford Branch, to carry out a preliminary survey of existing and proposed Nature Reserves in the London Area, and a Report was prepared for Professor Abercrombie in connection with the Greater London Plan.

The Presidential Address on December 18th was delivered by Mr J. B. Foster, and was entitled " The Good Earth." It was followed by the first, and perhaps the most successful, Brains Trust organised by the Society. Throughout the year the few ordinary meetings held were again on Saturday afternoons.

In 1944 the Survey work at Epping and Bookham was vigorously prosecuted by keen bands of workers and the result of that year's work is faithfully reflected in our Journal. Of a total of 75 pages no less than 50 are concerned with these ecological surveys and the relevant maps add much to the permanent value of the letterpress.

And so to 1945 and the end of the War. For us at Keppel Street the end of the Black-out, the end of the Siren, the end of the Curtain of Dread and Apprehension.

What had the Society to show to its returning members? Well, we too had done our bit. Mr J. B. Foster, as President, had remained at the helm throughout the war years, the principal officers had remained in office, the *London Naturalist* had been regularly and meticulously produced, the Surveys had been well commenced, and the whole organisation was, to use an expressive phrase, " in good working order."

I think some of us were buoyed up through the darkest days in the belief that it was all worth while, that ours was the responsibility of maintaining in safe trust for those who were absent, a living entity, in short, the London Natural History Society.

I have no moral to draw. For 90 years our Society has modestly reflected the customs and manners of the times in its natural history outlook. It must go forward in its striving for natural history truth, whatever the swirls and eddies of the current of changing conditions.

It was a very small splash in the Natural History world which our progenitors made in that upper room at Haggerston in 1858, but no irresistible rock has reared its head to subdue the ripples from that splash. Long may these ripples expand in ever-widening circles of effective natural history endeavour.

I feel that my story must end at this point. Perspective broadens, and contemporary events impinge.

In years to come, when some successor takes the story onward, he may pause a moment to be grateful to me that I lay down my pen in the Spring of 1945. I feel that it is zero hour for the L.N.H.S. I make to this future historian a gift. I present him with the synopsis of his first chapter. It is Peace, Regeneration, Re-inspiration, Fulfilment . . . and Success.

Ecological Aims and Methods for Zoologists.

By O. W. Richards, M.A., D.Sc.

BEFORE discussing how we propose to conduct ecological work, it is best to decide what we mean by the word "Ecology." Ecology is commonly defined as the "study of living organisms in relation to their environment." This definition is so broad that it includes a large part of both physiology and taxonomy. It leads to the difficulty that ecology becomes an aspect of the work of other sciences rather than a science in itself. While no one would insist that all science must be directly useful in a narrow sense, it is desirable that it should set out to answer definite questions and that these answers should in some way build up a unified whole with other sciences. Before further considering animal ecology it will be as well to make a brief survey of the history of ecology which began with the botanists.

When botanical ecology started 50-60 years ago, the first work was the description and mapping of plant communities. By listing and estimating the frequencies of species, ecologists were only putting into more accurate language what is immediately obvious to the layman, viz., that natural vegetation does tend to fall into recognizable communities which are repeated over the country wherever more or less similar conditions occur. It is now clear why plant communities are on the whole so easily recognizable and why this method of research has given such valuable results to the botanists.

Plants on the whole are competing for a few simple things—water, salts, and light. Any set of plants growing together are automatically in competition, at least as soon as the carpet approaches continuity. Competition for light normally leads to one or other plant species beating most of its competitors, thus making the edges of communities relatively sharp. As a result, very simple botanical methods, such as semi-quantitative listing of plant-species, tell us something about a real community.

Animal ecology arose from plant ecology at a considerably later date and it was natural at first to try and use the same methods. Moreover, because the vegetation is one of the most important factors in the life of all animals, especially of the abundant phytophagous insects, one does receive the first impression of definite animal communities corresponding to the plant ones. It is possible, therefore, to map the vegetation and then to endeavour to list the animals from the plant-habitats. One only has to call these lists "communities" and the preliminary work seems to be done. It may be noted in passing that the process of listing is, in the case of insects, an even more difficult process than is commonly supposed.

After a certain amount of this work, however, doubts begin to creep in, doubts which crystallize round the meaning of the word "com-

munity." In botany the word has a real meaning because the forms which live together are interconnected by competition. But the needs of animals are so much more varied that two species living in the same plant-habitat may not really enter into competition with one another. Even the species living on one plant often seem, at least in most years, to have no appreciable influence on one another; to a considerable extent the natural animal communities seem to cut across the plant-habitats. At the very best, it is still a large assumption to say that all the animals which live in one wood have an important effect on one another's abundance.

The word abundance introduces a new idea which has as yet hardly been touched on. The more accurate work of plant ecologists involves the counts of the numbers of individuals of each species on sample areas. The competition between plants determines not only what species are present but also their relative numbers. But owing to the more or less perennial habit of many plants the numbers of individuals may be rather stable over a period of years, so that it is possible, as a first approximation, to treat the subject in a static way.

In animals, on the other hand, owing to their mobility and to the short life of most of them, the yearly variations in numbers are very noticeable and it is hardly possible to continue very long in the listing of species without paying some attention to their numbers.

At this point it is convenient to consider again the definition which should be given to the science of animal ecology. One can, speaking very broadly, divide biological sciences into three groups:

Taxonomic—concerned with differences between species.
Physiological—concerned with resemblances between species.
Ecological—concerned with the abundance of species.

If ecology is looked at in this way, as a study of the reasons why species occur in certain numbers at certain times and places, a distinct department of knowledge is marked off, which is not the concern of any other branch of science. It is a subject which corresponds to what, in medicine, are called aetiology and epidemiology.

Unfortunately, there is no sort of agreement that it is desirable to divide up the field of biology in this way and in my view most taxonomists and physiologists make their sciences unduly narrow. The taxonomists, on the whole, are too interested in the morphological side of their subject. In entomology, for instance, while most taxonomists would admit that the food-plant of a phytophagous species would properly enter into its description, they rarely pay the same attention to the proper definition of the habitat of each species, though this is just as much a specific character as its structure.

Physiologists on the other hand tend to be more interested in the way in which organs or organ-systems work than in the whole animal. Most of the data on the effects of temperature and humidity on insect development has been provided by ecologists or economic entomologists, though the subject seems to me to be essentially one for physiological enquiry.

Because taxonomists and physiologists cannot provide the basic data, ecologists often have had to obtain them for themselves. This has led, in my opinion, to calling a lot of work ecology which is really something else.

Turning now to the actual practice of ecology, my remarks will be mainly applicable to insects. The general principles are the same for all groups, but the details differ considerably.

(1) If the question of numbers is to be taken seriously it will not be possible to study more than one or two species with similar habits simultaneously.

(2) The study of insect numbers is very much a whole time job. No doubt data useful for certain purposes can be obtained by comparing the maximum numbers observed in different years. But a full-scale study of numbers requires continuous observation and experiment throughout the active season.

(3) It is clear that people who can only give part of their time to such work cannot engage in population studies. I will, in a moment, suggest that there are nevertheless certain very profitable lines of work. But I will first give a brief account of what I mean by a full-time population study, describing some work recently started by Dr N. Waloff and myself on short-horned grasshoppers at the Imperial College Field Station, near Ascot.

The work, started last year, involved the following activities:—(1) Mapping the vegetation, delimiting the colonies of the five species of grasshopper present, choosing the colonies most suitable for detailed study. (2) Obtaining the elementary biological data about each species, e.g., oviposition-habits and sites, nature of the egg-pods, numbers of instars, specific differences in the instars, duration of the instars. (3) Determination of the length of life of the adult and of the number of eggs laid. (4) Estimations of numbers, both by counts on unit areas and by marking, releasing, and recapturing samples, throughout the season. (5) Estimations of the number of eggs by examining square-foot samples of soil.

It is hoped later to extend the work to include such things as a study of the mortality in each stage; the correlation of numbers with variations in the weather; studying the effects of such predators as birds by wiring in certain areas; studying the effect of artificially altering the vegetation.

For those who are unable to give their whole time to work of this sort, there is still a lot to do, particularly perhaps in obtaining what I have called the basic data.

(1) The obtaining and recording of data for vice-county lists is always useful. A distribution map is an indispensable tool in the study of the ecology of a species. It is, however, easier to do important work of this sort in a relatively unknown county such as Wiltshire than in the home counties.

(2) Studies of the detailed habitats of species, using methods such as those elaborated by Capt. C. Diver at Studland. This means tak-

ing a group which is relatively easy to identify in the field and plotting its distribution in the very large number of micro-habitats into which any area can be divided. It will mean much initial help from the botanists, but the final " loci " or habitat-units will be much smaller than the plant-habitats.

(3) Gathering information of the type needed for the British Ecological Society's " Biological Flora." This means a study of the animals attached to particular plants, either eating it or visiting its flowers. There is very little information about the polyphagous species which often, because of their commonness, eat a greater weight of vegetation than the species confined to particular plants.

(4) Where there is a likelihood that an area will be under observation for a number of years, it would certainly be worth while to try and keep records of the yearly variations in numbers of certain selected species, e.g., *Eristalis* spp., leaf-miners or gall-makers, tiger-beetle burrows. Rough estimates of this type which can be correlated with climate have already given valuable results in explaining seasonal variation in the numbers of wasps.

It must finally be said that it is difficult to obtain data of permanent scientific value without hard work. There are many forms of natural history which form a pleasant holiday relaxation but ecology is not one of them. One can only get out of a study the equivalent of what one puts into it.

Botanical Records for 1948.

Compiled by J. Edward Lousley.

THE weather of 1948 in the London Area was unkind to botanists and plants. March and April were warm and sunny and spring flowers were early. But towards the end of May the weather turned cold and wet; June, July and August were almost continuously unfavourable. Even the most enthusiastic phytologists found their activities hindered. Native plants favouring pond margins were scarce owing to lack of exposed mud and aliens from warmer countries germinated and grew indifferently. To some extent the autumn made amends for a poor summer. Apart from a short cold spell in October, mild weather lasted well on into the winter. Some of the best discoveries of the year were made during this late extension of the season.

In spite of the weather the number of records contributed by the botanists of the Society has been greater than ever and only a selection of those of importance can be included here. The following account is arranged in sequence of vice-counties:—

V.-c. 16, West Kent.

Some of the most useful records were made by R. A. Boniface. In a marsh by the river at Erith he found *Triglochin maritima* L. and

Oenanthe Lachenalii C. Gmel. which are frequent farther down the Thames estuary but seldom reported within our area. At Erith he also found several plants of *Sisymbrium Sophia* L. On and near the ruins of Lessness Abbey he saw *Silene nutans* L., *Calamintha nepeta* (L.) Savi, *Chenopodium murale* L. and *Melilotus indica* (L.) All. In grassy places in Joyden's Wood he discovered *Hypochoeris glabra* L. sparingly.

The small colony of *Orchis purpurea* reported in 1947 (*London Naturalist, No. 27*, 39) within 15 miles of St Paul's was shown to me by Francis Rose. Only one plant flowered but this put up a very fine and beautiful spike, and three other barren plants were observed.

In October Rose showed me fresh material of three plants he had collected in the company of E. C. Wallace in the neighbourhood of some heaps of shoddy in a field at Stonehill Green, Hextable, near Swanley Junction. " Shoddy " is a term used by farmers for waste material from woollen mills employed as a manure to increase the nitrogen content and water-retaining capacity of their soil. It sometimes contains seeds of plants from the countries of origin of the wool which, in spite of drastic treatment with chemicals at the mills, remain viable. On Tweedside, in Yorkshire, and in Bedfordshire, remarkable collections have been made of species brought from the Southern Hemisphere (mainly Australia) to grow on British soil. The Hextable occurrence of shoddy aliens is not a particularly good one but it is the first reported in our records of the London Area and therefore of particular interest to us. Most of the species found have hooks, spines or other adaptations on the fruits which have led to their becoming entangled in the sheep's wool.

The plant which first attracted Rose's attention was Bathurst Burr, *Xanthium spinosum* L., which is conspicuous for the yellow tripartite spines at the base of the leaves. This is believed to be of South American origin but is now a cosmopolitan pest in wool producing countries. With it was *Carduus pycnocephalus* L., a thistle allied to the common coastal *C. tenuiflorus* Curt., and *Amaranthus chlorostachys* (Willd.) Thell. A week later D. McClintock visited the same field and brought me specimens of over 20 aliens. But for a sharp frost in the meanwhile, which had killed the more tender plants, the list would have no doubt been longer, but I was able to identify the following:— *Sisymbrium erysimoides* Desf. (Mediterranean, etc.), *Erodium Botrys* (Cav.) Bert. (Mediterranean), *E. cygnorum* Nees, *Medicago minima* (L.) Bartol. var. *recta* (Desf.) Burnat (Mediterranean), *M. hispida* Gaertn. (Europe), *M. laciniata* (L.) Miller (Mediterranean), *Calotis cuneifolia* R. Br., *C. hispidula* F. v. Muell., *Carthamus lanatus* L. (S. Europe), *Chenopodium Probstii* Aellen, *C. murale* L. (Europe), *Digitaria didactyla* Willd. (Mascarene Isles), *Dactyloctenium radulans* P. Beauv., *Diplachne fusca* (L.) Beauv. (the three grasses identified by Mr C. E. Hubbard of Kew). All these plants are found in Australia and the wool in which their seeds were entangled must have come from there. But some of them are natives of other parts of the world as indicated

in brackets and these much-travelled species established themselves as aliens in Australia before being brought back to us.

McClintock also got *Chenopodium glaucum* L. and *Melilotus indica* (L.) All. at Kemsing Station just outside our area.

V.-c. 17, Surrey.

The inclusion of *Calla palustris* L. in British floras is based on its occurrence at Boldermere (The Hut Pond) Wisley. There is little doubt that it was deliberately planted here about 1861 but the persistence of this pond plant, which has unusual biological features, has been the subject of a number of notes in botanical journals. I last saw it in 1927 when it was small and scarce and subsequent searches were unsuccessful. Its rediscovery by Boldermere near the old spot, in a flourishing condition, by W. H. Spreadbury and W. J. Finnigan in 1948, was therefore gratifying.

Spreadbury also reported Ivy Broomrape, *Orobanche Hederae*, as parasitic on ivy on the tow-path between Richmond and Kew. This is the first record of the species from our members, though it has been found in Surrey previously in three places—one of them Kew Gardens. Mrs B. Welch is responsible for sending two important records of grasses. Near Pyrford (about two miles outside our boundary) she refound *Panicum Ischaemum* Schreb., a rarity of sandy fields which was once fairly plentiful in that district. On Barnes Common she directed me to a patch of *Cynodon Dactylon* (L.) Pers. which was discovered by her friend Mrs M. Whitehouse. Doab Grass is well known in the Channel Isles and South-West England: the only previous occurrence in Surrey was on Kew Green, where it has long been extinct.

R. A. Boniface records *Fumaria Boraei* Jord. from waste ground at Croydon and from Westend Common, Esher. He also found two plants of *Coriandrum sativum* L. by the Thames opposite Hammersmith, which is specially interesting on account of Mrs H. R. Davies' 1944 record of the same species near Ferry Lane, Kew. Specimens were also sent to me from a tip at Earlswood by Miss B. M. C. Morgan, who also got *Peucedanum graveolens* (L.), *Lappula echinata* Gilib., *Setaria italica* (L.) Beauv. and *Atriplex littoralis* L. at the same spot. The last is a maritime species which extends into our Area along the Thames but is a most surprising find so far inland as Earlswood.

In September I saw a fine plant of *Ricinus communis* L., the Castor-oil Plant, on the edge of a gravel-pit at Ham growing near *Abutilon Theophrasti* Med. Early in October, J. P. M. Brenan discovered an abundance of *Lagarosiphon major* (Ridley) Moss in a small pit near Teddington Lock. On his directions I was able to see it in flower a week later. This African aquatic might easily be mistaken for a very large Canadian Water-weed, *Elodea canadensis* Michx. It has become established in a pond in Bedfordshire for several years and is believed to have been introduced by aquarists. On Mortlake tip there was an abundance of *Chenopodium opulifolium* Schrad. and ×*C. variabile* Aellen.

During 1947 rumours circulated among botanists of some remarkable aliens in a bomb-crater on Box Hill. In July 1947 a specimen of a yellow-flowered Foxglove, *Digitalis lutea*, was sent to Kew for identification, but it was not until May 1948, when I found the crater for myself, that I was aware of the exact locality. This is more accurately described as Brockham Hill, and the crater is on the edge of a wood, some ten yards from the nearest track, and situated where accidental introduction of aliens seems most unlikely. I visited it at intervals throughout the summer.

Three other species of Foxglove, *Digitalis ambigua* Murr., *D. lanata* Ehrh., and *D. ferruginea* L., were well established and spreading away from the crater into the surrounding wood. With them grew a number of uncommon species included in the British floras, such as *Iberis amara* L., *Isatis tinctoria* L., *Geranium pratense* L., *Myrrhis odorata* (L.) Scop., *Chrysanthemum Parthenium* (L.) Bernh., *Inula Helenium* L., and *Leonurus Cardiaca* L. In addition, the following foreign plants were collected:—*Lunaria rediviva* L., *Cochlearia glastifolia* L., *Erysimum helveticum* DC., *Diplotaxis erucoides* L., *Lepidium graminifolium* L., *Lavatera Thuringiaca* L., *Dorycnium herbaceum* Vill., *Asperula tinctoria* L., *Campanula alliariifolia* Willd., *Linaria origanifolia* L., *Ballota acuta* (Moench) Briquet and *Beta trigyna* Waldst. & Kit. Most of the species found are natives of South-East or Central Europe, but a satisfactory explanation of how their seeds got to the crater has yet to be made.

V.-c. 18, South Essex.

Ranunculus Lingua L. was found in a pond at Baldwin's Hill, Loughton, on a Chingford Branch excursion and reported by J. H. G. Peterken.

V.-c. 21, Middlesex.

Following correspondence with R. S. R. Fitter an excellent painting of *Dianthus Armeria* L. collected from the edge of the running track at the foot of Parliament Hill in 1941 was sent to me by H. C. Harris. He also produced evidence of *Vicia lutea* L. from a roadside close to Scratch Wood in 1948 and *Claytonia alsinoides* Sims in plenty on Hampstead Heath extension.

Dr S. E. Chandler sent a specimen of ×*Senecio londinensis* Lousley from a car park at Marsham Street, Westminster. An interesting note came from W. E. Farenden, who still has *Fritillaria Meleagris* L. growing in his garden which he dug up at Pinner when the field was "developed" and the locality destroyed.

During the year my account of the Fig, *Ficus Carica* L., in Britain was published (*B.E.C. 1946/7 Rep.*, 330-333, 1948). In summarising occurrences in various parts of the country I indicated the strong probability that birds were responsible for introducing the seeds to some of the places, including many of the London bombed sites. Any notes from ornithologists of birds feeding on rotten figs thrown out on rub-

bish tips, or of migrants visiting London which would be likely to feed on figs in the Mediterranean area, will be very welcome. That more than one explanation of the introduction of figs is probable is shown by well-grown trees producing good fruit which I was shown on the site of a bombed dried-fruit warehouse in October 1948 in London Dock. *Apium graveolens* L., which is usually a coastal plant, was observed on a broken wharf in the same Dock.

Records of the City bombed sites have been continued during the year. London Rocket, *Sisymbrium Irio* L., on the City boundary, has slightly extended its ground and there are now three colonies of this rarity within a small area. Three interesting grasses are new. A large patch of *Calamagrostis epigeios* (L.) Roth in Ave Maria Lane by St Paul's produced its handsome spikes sparingly. With it, *Bromus ramosus* Huds. was growing. On a bombed site near Mark Lane, D. McClintock and I found *Lolium temulentum* L. when we went to see some astonishingly large plants of *Melandrium noctiflorum* (L.) Fr. which had been discovered by R. A. Graham. The first rush noticed in the City, *Juncus inflexus* L., was shown by F. E. Wrighton a few minutes after I had remarked on the apparent absence of this genus. The cornfield weed, *Scandix Pecten-Veneris* L., was seen in Old Jewry —Miss Pamela C. Bain also reported it from her garden at Northwood. I had previously found it in the City in Bush Lane in 1945.

A considerable amount of work is necessary before a new edition of *Records of the London Area* can be contemplated. More records are required of native plants before their present distribution can be adequately covered. This applies especially to the less showy species and to groups in which care is required for identification. Grasses and Sedges have been generally neglected. Critical groups such as *Euphrasia, Hieracia, Batrachian Ranunculi, Rubus, Potamogeton* and *Rosa* have been little studied in recent years. If any member would care to undertake collecting material with a view to a revision of one of these genera in the London Area I shall be pleased to give all the help I can. My own efforts during the coming season will be devoted to *Hieracium*, of which I hope to give an account at an early date.

In spite of the comments in the last paragraph, it will be apparent from this paper that very good progress is being made with the work of improving the standard of the Society's records of flowering plants. To the members who have contributed notes during the year our grateful thanks are due. Their records have all been entered in the card index even if it has not always been possible to include them in this report.

Middlesex Plant Records for 1948.

By Douglas H. Kent.

THE year has been an interesting one for Middlesex botanists, and although, apart from a few alien species, no new plants have been recorded from the county, much useful work has been done in filling in the many gaps in the known distribution of a number of the less common species.

Mrs B. Welch is to be congratulated on her rediscovery of *Carex binervis* Sm. on Stanmore Heath, from which place it has possibly not been collected for a quarter of a century. She is also to be complimented on detecting the rare hybrid, *Senecio squalidus* × *vulgaris*, on a rubbish tip near Hounslow Heath. H. C. Harris has contributed many interesting records from the Hampstead district, but his best find is *Pimpinella major* (L.) Huds. from Edgwarebury, a new station for an extremely local Middlesex species. W. C. R. Watson has sent a number of records, which include *Rosa tomentosa* Sm. from Horsenden Hill near Greenford; this rare Middlesex rose was probably last collected from that locality by John Benbow in 1887. A number of useful records from the Ruislip and Harefield areas have come from F. E. Wrighton, one of the most interesting being *Nepeta Cataria* L. from near Harefield, thus illustrating the continued existence of a species in or near the locality where it was first recorded by John Blackstone in 1737.

Among the most interesting of my own discoveries are *Rumex palustris* Sm. by the Paddington Canal near Kensal Green Cemetery, *Vulpia Myuras* (L.) Gmel. near Harefield, *Lolium temulentum* L. on a rubbish tip at Hanwell and *Elymus canadensis* L., a North American grass, on waste ground at Yiewsley.

Sincere thanks are again due to the many friends and members of the Society who have contributed records. Where a record bears no finder's name I am alone responsible for its inclusion. I am indebted to the following specialists for a great deal of help and assistance in naming critical and alien material, which determinations are followed by their respective initials:—Messrs J. P. M. Brenan (Aliens), R. W. Butcher (*Batrachia*), R. Graham (*Mentha*), C. E. Hubbard (*Gramineae*), J. E. Lousley (*Rumex*), and the late H. W. Pugsley (*Hieracia*).

The nomenclature used in this paper is based on that of Prof. A. R. Clapham's Check List of British Vascular Plants, *Journal of Ecology*, Vol. 33, No. 2, pp. 308-47, and for alien species that of Druce's *British Plant List*, Ed. 2, 1928. As in my previous papers the number preceding a record refers to the botanical district given in Trimen and Dyer's *Flora of Middlesex*, 1869. New county records are preceded by an asterisk, and alien species by a dagger.

In conclusion, I have received a number of enquiries regarding plants which may now have become extinct in the county. A list of these will

be found at the end of this paper, and I should be grateful to hear from any member who has any information regarding any of them.

Clematis Vitalba L. II. Fulwell Golf Course. III. Crane Park, Twickenham. IV. By Jack Straw's Castle, Hampstead; H. C. Harris. Child's Hill, Golders Green. Golders Hill Park; H. C. Harris and D. H. Kent. V. Strand on the Green. VII. Bombed site, Wellington Road, N.W.8.

Ranunculus Lingua L. I. Abundant and completely naturalized around the lake in Grimsdyke grounds, Harrow Weald; B. Welch and D. H. Kent.

R. fluitans Lam. I. Frays River, Cowley Peachey. II. River Colne, Staines Moor. Both dét. R.W.B.

R. pseudo-fluitans auct. angl. I. River Colne, Denham, Uxbridge Moor and Cowley Peachey. All det. R.W.B.

†*Papaver somniferum* L. II. Rubbish tip, Dawley. IV. West Heath, Hampstead. VI Road bank near Finchley.

Fumaria Boraei Jord. II. Cultivated ground near Perry Oaks.

Cardamine amara L. V. Wood in Osterley Park; L. G. Payne.

C. pratensis L. var. *dentata* (Schultes). III. Gutteridge Wood, Northolt.

†*Descurainia Sophia* (L.) Prantl. (*Sisymbrium Sophia* L.). II. Rubbish tip, Dawley, abundant. V. Rubbish tip, Hanwell, abundant.

†*Sisymbrium altissimum* L. VII. Bombed site, Great Russell Street, W.C.1.

†*S. orientale* L. I. Harefield; B. Welch. III. Hounslow Heath; C. E. Hubbard and D. H. Kent. VII. Canal path near Westbourne Park.

†*S. officinale* (L.) Scop. var. *leiocarpum* DC. IV. Willesden Green. VII. East Heath, Hampstead; H. C. Harris and D H. Kent.

Lepidium Smithii Hook. I. Near the Copper Mills, Harefield; B. Welch.

†*Rapistrum rugosum* (L.) All. I. Waste ground, Yiewsley. V. Rubbish tip, Hanwell, abundant.

Melandrium noctiflorum (L.) Fr. V. Garden weed, Corfton Road, Ealing; M. E. Cattley, comm. B. Welch.

Cerastium arvense L. III. Abundant in a field near Hounslow Heath; D. Bennett, comm. B. Welch.

†*Claytonia alsinoides* Sims. I. Hedgebank, Shepherds Hill, Harefield. IV. North West Heath and Heath Extension, Hampstead; H. C. Harris.

Hypericum hirsutum L. IV. Near Mill Hill East Rly. Station.

H. dubium Leers. Owing to a confusion of nomenclature this plant was recorded for Hampton Court (*Lond. Nat.*, 1946, 59). The plant found there by Mrs Welch should be referred to *H. quadrangulum* L.

Geranium pratense L. III. Abundant in a meadow by the Cran, Hounslow Heath; C. E. Hubbard and D. H. Kent.

G. molle L. var. *grandiflorum* Vis. II. Abundant on a hedgebank near Stanwell village.

†*Impatiens parviflora* DC. IV. Oakhill Way, Hampstead; J. K. Hasler. By Jack Straw's Castle, Hampstead; H. C. Harris. VII. East Heath, Hampstead; H. C. Harris.

Rhamnus cathartica L. IV. Whitchurch Common; B. Welch and D. H. Kent.

Genista anglica L. IV. Sparingly on Whitchurch Common; B. Welch and D. H. Kent.

†*Vicia villosa* Roth. V. Cornfield near Southall. VII. Among crops, Ken Wood Fields; J. E. Lousley, H. C. Harris and D. H. Kent.

†*V. dasycarpa* Ten. VII. Abundant among crops, Ken Wood Fields; H. C. Harris and D. H. Kent.

V. angustifolia (L.) Reichard *fl. albo*. II. Abundant in a meadow at Dawley.

Lathyrus Nissolia L. I. Abundant above Harefield Quarry. IV. Scratch Wood, Edgwarebury; H. C. Harris.

Sanguisorba officinalis L. IV. A single plant by the railway near West Hampstead Station; R. Graham.

Rosa tomentosa Sm. V. Horsenden Hill, a single small bush; W. C. R. Watson.

Sorbus torminalis (L.) Crantz. V. Horsenden Hill; W. C. R. Watson.

Chrysosplenium oppositifolium L. IV. Boggy low lying parts of Scratch Wood; B. Welch and D. H. Kent. V. Osterley Park; B. Welch.

Ribes rubrum L. IV. Scratch Wood and Mote Mount Park, Edgwarebury; B. Welch and D. H. Kent.

Myriophyllum spicatum L. VII. Vale of Health Pond, East Heath, Hampstead; H. C. Harris and D. H. Kent.

Hydrocotyle vulgaris L. II. Staines Moor.

Apium inundatum (L.) Reichb. f. II. Verge of a pond on Staines Moor; M. Collett.

Pimpinella major (L.) Huds. IV. Near Scratch Wood, Edgwarebury; H. C. Harris.

*†*Callistemma hortense* Cass. II. Rubbish tip, Dawley.

†*Galinsoga quadriradiata* Ruiz. & Pav. IV. Roadside, Cobbold Road, Willesden Green. Well Walk, Hampstead; H. C. Harris, det. J.E.L. VII. A large patch by the railings of Lygon Place, S.W.1. Near Lords Cricket Ground, N.W.8.

†*Artemisia Verlotorum* Lam. I. Rubbish tip, Yiewsley. II. Abundant about Fulwell Golf Course. III. Frequent about Hanworth. Near Hayes Railway Station. IV. Bombed site, Church Lane, Willesden.

†*Petasites fragrans* (Vill.) C. Presl. VI. Hedgebank, High Road, North Finchley.

Senecio squalidus L. × *vulgaris* L. III. Rubbish tip, Hounslow Heath; B. Welch.

Carduus crispus L. V. Canal path, North Hyde, Southall.

Centaurea Cyanus L. I. Railway bank, Northwood.

Picris echioides L. VI. Rocket area, Noel Park, 1947; M. Scholey.

Hieracium virgultorum Jord. I. Copse Wood, Northwood, 1945; B. Welch. Near Harefield, 1945. Both det. H.W.P.

Lactuca virosa L. I. Rubbish tip, Yiewsley, abundant.

†*Tragopogon porrifolius* L. VI. On grass verge by the Education Offices, Southgate, 1944, also several plants across the road by Arnos Grove Tube Station, 1946-47; M. Scholey.

*†*Rhododendron ponticum* L. I. Hundreds of plants appearing spontaneously from self sown seed in the grounds of Grimsdyke, Harrow Weald. V. Chiswick House Grounds, self sown.

†*Symphytum peregrinum* Ledeb. VI. Plentiful by the Lea Navigation Canal about Enfield Lock; F. Clarke.

Lycopsis arvensis L. VI. Bush Hill Park, Enfield; P. J. Hanson.

Myosotis versicolor Sm. IV. Very abundant on ant heaps in Scratch Wood, Edgwarebury; B. Welch and D. H. Kent.

Lithospermum arvense L. V. Canal path between Hanwell and Southall, a single plant.

Calystegia sepium (L.) R. Br. var. *americana* (Sims) Hyl. I. Hedges, Rickmansworth Road, Northwood. Near Cowley Church.

†*Nicandra Physaloides* Gaertn. I. Forecourt of Soya Foods Ltd., Springwell Lock; J. P. M. Brenan and N. Y. Sandwith.

†*Datura Stramomium* L. III. A frequent weed in Marble Hill Park, Twickenham. VI. Bombed site, Turnpike Lane, Hornsey, 1947; M. Scholey.

†*Mimulus moschatus* Lindl. VII. Naturalized by the lake in Ken Wood; H. C. Harris.

Veronica montana L. IV. Scratch Wood, Edgwarebury; B. Welch and D. H. Kent.

Melampyrum pratense L. VI. Queens Wood, Highgate; R. S. R. Fitter.

Verbena officinalis L. VI. Bombed site, Pellatt Grove, Wood Green; M. Scholey

Mentha arvensis L. forma *angustifolia* Fraser. I. Pinner Hill, 1946. Stanmore Heath, 1947. IV. Brent Meadows, Hendon. All det. R.G.

Nepeta Cataria L. I. Between Harefield and Springwell; F. E. Wrighton.

†*Amaranthus retroflexus* L. III. Rubbish tip, Hounslow Heath, abundant.

‡Var. *Delilei* Thell. I. Forecourt of Soya Foods Ltd., Springwell Lock; J. P. M. Brenan and N. Y. Sandwith.

†*Chenopodium opulifolium* Schrad. V. Frequent on waste ground by the Thames, Chiswick; J. P. M. Brenan and D. H. Kent.

†*C. hircinum* Schrad. V. Rubbish tip, Hanwell 1946; N. Y. Sandwith and D. H. Kent, conf. J.P.M.B.

Polygonum Bistorta L. IV. Whitchurch Common; B. Welch and D. H. Kent.

*†*P. polystachyum* Meisn. IV. Waste ground, The Hyde, Hendon. VII. Highgate Ponds; H. C. Harris.

†*Fagopyrum sagittatum* Gilib. II. Rubbish tip, Dawley.

Rumex obtusifolius L. × *palustris* Sm. V. Marsh near the canal, Hanwell; J. E. Lousley and D. H. Kent, det. J.E.L.

R. pulcher L. V. Syon Park.

R. palustris Sm. V. Canal side near Norwood Green. VII. By the Paddington Canal near Kensal Green Cemetery.

†*Euphorbia virgata* Waldst. & Kitt. II. Abundant in a meadow between West Drayton and Dawley. V. Railway bank between White City and East Acton. VI. Recreation ground, Whetstone. By the Lea near Waltham Cross; F. Clarke. VII. Hampstead Heath Extension; H. C. Harris, det. J.E.L.

Narcissus Pseudo-Narcissus L. VI. Naturalized in a little copse near Muswell Hill.

†*Juncus tenuis* Willd. I. Canal bank, Springwell Lock; J. P. M. Brenan, N. Y. Sandwith, C. West and D. H. Kent.

Luzula sylvatica (Huds.) Gaud. I. Grounds of Grimsdyke, Harrow Weald; B. Welch and D. H. Kent.

L. Borreri Bromf. (*L. Forsteri* (Sm.) DC. × *pilosa* (L.) Willd.). I. Stanmore Heath. IV. Scratch Wood, Edgwarebury; B. Welch and D. H. Kent.

Zannichellia palustris L. VI. Pond near Whetstone.

Carex binervis Sm. I. A large patch still on Stanmore Heath; B. Welch.

C. pilulifera L. I. Grounds of Grimsdyke, Harrow Weald; B. Welch and D. H. Kent.

†*Echinochloa Crus-galli* (L.) Beauv. III. Carrot field near Feltham; I. W. Davies.

†*Setaria italica* (L.) Beauv. III. Carrot field near Feltham; I. W. Davies.

Agrostis canina L. var. *fascicularis* (Curt. ex Sincl.) Sincl. III. Low lying meadows by the Cran, Hounslow Heath; C. E. Hubbard and D. H. Kent, det. C.E.H.

Avena fatua L. var. *pilosa* Syme. VII. Bombed site, Holborn, W.C.; C. E. Hubbard.

Var. *glabrata* (Peterm.). III. Rubbish tip, Hounslow Heath; C. E. Hubbard and D. H. Kent, det. C.E.H.

Sieglingia decumbens (L.) Bernh. VII. Still abundant on East Heath, Hampstead; H. C. Harris and D. H. Kent.

Glyceria declinata Bréb. III. Pool near Hounslow Heath; C. E. Hubbard and D. H. Kent, det. C.E.H.

Festuca arundinacea Schreb. subvar. *strictior* Hack. III. Hounslow Heath; C. E. Hubbard and D. H. Kent, det. C.E.H.

F. pratensis Huds. I. Springwell. Harefield. Drayton Ford. Yiewsley. Ruislip Common. III. Very abundant in low lying meadows by the Cran, Hounslow Heath; C. E. Hubbard and D. H. Kent. Crane Park, Twickenham. V. Abundant in meadows by the canal, Hanwell. Strand on the Green. VI. Finchley Common. Whetstone.

×*Festulolium loliaceum* (Huds.) P. Fourn. (*Festuca pratensis* Huds. × *Lolium* perenne L.). I. Drayton Ford. III. Abundant with both parents in a low lying meadow by the Cran, Hounslow Heath; C. E. Hubbard and D. H. Kent, det. C.E.H.

Festuca rubra L. var. *genuina* Gaud. III. Hounslow Heath, very abundant and forming large areas of turf; C. E. Hubbard and D. H. Kent, det. C.E.H.

Var. *dumetorum* (L.) Lej. & Court. I. Canal bank near Uxbridge, det. C.E.H.

Vulpia Myuros (L.) Gmel. I. Abundant near the Copper Mills, Harefield.

Bromus commutatus Schrad. III. Rubbish tip, Hounslow Heath; C. E. Hubbard and D. H. Kent, det. C.E.H.

†*B. carinatus* Hook. & Arn. V. Corner of Hartington Road and Great Chertsey Road, Chiswick; B. Welch.

†*Lilium temulentum* L. V. Rubbish tip, Hanwell.

Agropyron repens (L.) Beauv. forma *ramosum* (Schumach.). VI. Garden ground, Southgate; R. S. R. Fitter, det. C.E.H.

Nardus stricta L. VII. Still abundant by the Vale of Health Pond, East Heath, Hampstead; H. C. Harris and D. H. Kent.

*†*Elymus canadensis* L. I. Waste ground, Yiewsley; det. J.P.M.B. and D H. Kent.

Phyllitis Scolopendrium (L.) Newm. VI. Old wall, Alexandria Grove, North Finchley.

Asplenium Adiantum-nigrum L. II. Old wall near Stanwell village..

Athyrium Filix-femina (L.) Roth. V. Wood in Osterley Park; L. G. Payne. Chiswick House Grounds.

†*Azolla filiculoides* Lam. II. Very abundant in streams and brooks about Stanwell Moor. Abundant in the Colne, Staines Moor.

The following species are almost certainly extinct in Middlesex and there is little chance of them being refound, except perhaps in some cases as casual introductions. The date following each plant is that of the last known record. *Helleborus viridis* L. (1791), *Corydalis claviculata* (L.) DC. (c. 1750), *Cochlearia anglica* L. (1870), *Viola palustris* L. (c. 1915), *Kohlrauschia prolifera* (L.) Kunth (1837?), *Cucubalis baccifer* L. (1853), *Hypericum elodes* L. (c. 1826), *Althaea officinalis* L. (1737), *Erodium moschatum* (L.) Ait. (1815), *Trifolium squamosum* L. (c. 1721), *Parnassia palustris* L. (1900), *Umbilicus pendulinus* DC. (1763), *Drosera rotundifolia* L. (c. 1934), *Cicuta virosa* L. (1763), *Oenanthe Lachenalii* C. C. Gmel. (1847), *Tordylium maximum* L. (1837), *Galium anglicum* Huds. (1690?), *Kentranthus Calcitrapa* (L.) Dr. (1825), *Aster Tripolium* L. (1903), *Arnoseris minima* (L.) Schweigg & Koerte (1778), *Crepis foetida* L. (1878), *Lactuca saligna* L. (1820), *Sonchus palustris* L. (1835), *Centunculus minimus* L. (1795), *Anagallis tenella* (L.) Murr. (1813), *Samolus Valerandi* L. (1866), *Gentiana pneumonanthe* L. (1840), *Cynoglossum germanicum* Jacq. (1705), *Scrophularia umbrosa* Dum. (1841), *Orobanche Rapum-genistae* Thuill. (1877), *Utricularia minor* L. (1774), *Beta maritima* L. (1887), *Orchis ustulata* L. (1737), *O. purpurea* Huds. (1737), *O. militaris* L. (1900), *Plantathera chlorantha* (Cust.) Rchb. (1885), *Iris foetidissima* L. (1873), *Leucojum aestivum* L. (1837), *Allium oleraceum* L. (1869), *Lilium Martagon* L. (1871), *Colchicum autumnale* L. (1873), *Juncus Gerardi* Lois. (1878), *Potamogeton polygonifolius* Pourr. (1884), *Cyperus fuscus* L. (1865), *Scirpus caespitosus* L. (1737), *Juniperus communis* L. (1763), *Pilularia globulifera* L. (1763?), *Lycopodium inundatum* L. (1828?) and *L. clavatum* L. (1865).

The following plants have not been recorded in the county for many years and a number of them are possibly extinct, some however are likely to be refound. The date of the last known record follows each species. *Adonis annua* L. (1884), *Myosurus minimus* (1896), *Ranunculus parviflorus* L. (1885), *Papaver hybridum* L. (1907), *Fumaria purpurea* Pugsl. (1892), *Turritis glabra* L. (1860), *Cardamine impatiens* L. (1901), *Teesdalia nudicaulis* (L.) R.Br. (1907), *Helianthemum guttatum* (L.) Mill. (1907), *Viola lactea* Sm. (1868), *Sagina nodosa* (L.) Fenzl. (1906), *S. subulata* (Sw.) C. Presl (c. 1790), *Radiola linoides* Roth (1890),

Trigonella ornithopodioides (L.) DC. (1885), *Trifolium scabrum* L. (1872), *T. glomeratum* L. (1871), *Vicia Lathyroides* L. (1869), *Geum rivale* L. (1910), *Rosa spinosissima* L. (1887), *Bupleurum tenuissimum* L. (1869), *Asperula cynanchica* L. (1862), *Inula Helenium* L. (1909), *Pulicaria vulgaris* Gaertn. (1908), *Cirsium dissectum* (L.) Hill (1884), *Hypochaeris glabra* L. (c. 1843), *Pyrola minor* L. (1908), *Centaurium pulchellum* (Sw.) E. H. L. Krause (1896), *Cynoglossum officinale* L. (1903), *Myosotis secunda* A. Murr. (1847), *Lithospermum officinale* L. (1883), *Cuscuta epithymum* (L.) Murr. (1900), *Limosella aquatica* L. (1875), *Utricularia neglecta* Lehm. (1887), *Mentha rotundifolia* (L.) Huds. (1746), *M. Pulegium* L. (1871), *Chenopodium urbicum* L. (1912), *Rumex maritimus* L. (1886), *Asarum europaeum* L. (1909), *Euphorbia platyphyllos* (1884), *Epipactis purpurata* Sm. (1909), *Ophrys insectifera* L. (1907), *Coeloglossum viride* (L.) Hartm. (1914), *Plantathera bifolia* (L.) L. C. Rich. (1887), *Crocus albiflorus* Schult. (*C. vernus* (L.) All. non Mill.) (1935), *Damasonium Alisma* Mill. (1886), *Potamogeton alpinus* Balb. (1884), *P. compressus* L. (1875), *Scirpus triqueter* L. (1887), *Carex dioica* L. (1792), *C. divisa* Huds. (1887), *C. appropinquata* Schum. (c. 1936), *C. strigosa* Huds. (1884), *C. laevigata* Sm. (1830), *C. rostrata* Stokes (1792), *Blechnum spicant* (L.) Roth (1907), *Polystichum setiferum* (Forsk.) Woynar (1905), *P. aculeatum* (L.) Roth (1870), *Thelypteris Oreopteris* (Ehrh.) C. Chr. (1858), *Nitella mucronata* Miquel (1719), *Tolypella intricata* Leonh. (1917) and *T. glomerata* Leonh. (1877).

Juniper Survey.

AS the result of correspondence between our late President, Mr L. G. Payne, and Mr A. Malins Smith of Shipley, Yorkshire, the Botanical Section has undertaken a Juniper Survey of its area on similar lines to the Juniper Survey conducted by the Yorkshire Naturalists' Union at Moughton Fell and elsewhere since 1925.

In Yorkshire it seems that degeneration is usual and widespread, that death is not always due to old age and that there is a shortage of young plants.

The help of members in all sections would be welcomed; information is being collected on the following points:—

1. Distribution, present and past.
2. Apparent health or sickness of plants.
3. Evidence of fungal or insect attack, and date, method and effects of attack. Any galls?
4. Do birds eat the berries?
5. Do rabbits nibble the bark?
6. Percentage of bushes bearing a good crop of berries and if previous years' are ripening.
7. Occurrence and number of seedlings or small plants.

Any information should be sent to Mrs B. Welch, 49 Lichfield Court, Richmond, Surrey.

An Excursion to Box Hill to study Junipers has been arranged for 21st May 1949.

NOTES.—The bushes flower in May but fruits take 2 or 3 years to mature. Near London it seems that on some bushes, abundant berries are formed, but that most fail to reach maturity. On Riddlesdown there are plenty of thriving bushes, perhaps 100 years old. In Yorkshire it is estimated that some are up to 200 years old. Small plants are more easily found in winter.

City Bombed Sites Survey.

Progress Report.

THE second year on the Cripplegate bombed site has been one of steady work and the accumulation of useful data. The botanists especially, under the guidance of Mr F. E. Wrighton, have done a great deal of intensive work; a paper by Mr Wrighton appears on page .

Less progress has been made with the study of the fauna. A paper on the spiders by Mr A. E. Le Gros, who has unfortunately moved away from London, appears on this page. Mr J. D. Hillaby has been engaged in a study of the fauna of the water in the sumps of the E.W.S. tanks, and Mr D. F. Owen has made a preliminary survey of the lepidoptera and was able to show at a meeting of the Entomological Section an interesting exhibit of the species which he had found. Mr L. Parmenter has continued his study of the Diptera. There is, however, scope for much more work by entomologists.

The presence of the Black Redstart has not proved to be an unmixed blessing; although it attracts a fair number of ornithologists, it inevitably tends to occupy their attention to the exclusion of commoner species. It is hoped, nevertheless, to publish a preliminary account of the birds next year.

Notes on the Spiders of the Bombed Sites.

By A. E. LE GROS.

Dr W. S. Bristowe (1) has given an account of the spider fauna of inner London and has pointed out that the soot pollution of the City has eliminated many species which originally existed here. He states that " The feet of a spider are delicate tactile and chemotactic organs, and it may be that these are dulled by a fine sooty covering, or that the fine dust clogs their respiratory organs and glands, or that the chemotactic sense of some spiders is repelled by the taste or smell by-product."

A repugnance to soot contamination appears to be the main reason for the scarcity of orb-web spinners (Argyopidae) on the bombed site, where food (Diptera) is plentiful.

The list, given below and with no claim to completeness, of spiders collected at intervals during 1947-8 includes only one Argyopid—*Araneus diadematus* Clerck. A limited number of females were obtained from webs spun across *Epilobium angustifolium*. The other species listed (with the exceptions of the *Euophrys* and the *Lycosa*) are well distributed and often abundant in parks and gardens in the city. They belong mainly to ground-living and hunting genera (*Oonops*, *Salticus*, *Sitticus* and *Xysticus*) and to species (the *Ciniflo*, the *Tegenaria*, *Stearodea bipunctata* Linn. and *Labulla thoracica* Wid.) commonly associated with the buildings of man. It would appear that these species have built up a resistance to the effects of a smoke laden atmosphere.

A female *Euophrys aequipes* Cb. was found on 17th May 1947 in leaf-debris in St Giles churchyard. This Salticid has been recorded mainly from the open, grass fields of the south and south-west and occasionally from the north. Mr Currie has suggested that the spider may have been introduced into the area with hay delivered to the nearby stables. Whether it can establish itself on the bombed site is doubtful, but one may note that an allied species, *E. frontalis* Walck, has been found not uncommonly in some London gardens.

A check of the relative number and distribution of the two common house spiders (*Tegenaria atrica* C.L.K. and *T. domestica* Linn.) was made in the summers of 1947-8 and it is hoped to continue this investigation in 1949. It is clear that *atrica* has been able to thrive abundantly amongst the debris and rubble in the open; but *domestica*, which requires a cool, shady habitat, is restricted here to an occasional dark cellar and the shells of bombed buildings.

Examining the web of a *Ciniflo* sp. under a large block of rubble two females of the tiny *Oonops pulcher* Temp. were seen on its outskirts. Dr Bristowe (*op. cit.*) first noted the association that sometimes occurs between *Ciniflo* and *Oonops*—the latter presumably acts as a scavenger in the web of the larger spider.

Of Arachnida other than Spiders, the harvestman, *Liobunum rotundum* Latr., was noticeably common in the autumn of 1947, numbers resting in the shade of walls in the immediate neighbourhood of St Giles Church.

I am indebted to Dr A. F. Millidge for the identification of *Euophrys aequipes* Cb. and to Mr G. H. Locket for advice on nomenclature.

DICTYNIDAE.
Ciniflo similis Bl.
C. fenestralis Stroem.

OONOPIDAE.
Oonops pulcher Templ.

DRASSIDAE.
Drassodes lapidosus Walck

THOMISIDAE.
Xysticus cristatus Clerck (=*X. viaticus* Linn.).

SALTICIDAE.
Salticus scenicus Clerck (=*S. scenicus* Linn.).
Euophrys aequipes Camb.
Sitticus pubescens Fabr.

LYCOSIDAE.
Lycosa sp. (immature).

AGELENIDAE.
Tegenaria atrica C. L. Koch.
T. domestica Linn.

ARGYOPIDAE.
Araneus diadematus Clerck
(=*Aranea diadema* Linn.).

THERIDIIDAE.
Theridion denticulatum Walck.
T. ovatum Clerck
(=*T. redimitum* Linn.).
Stearodea bipunctata Linn.

LINYPHIIDAE.
Erigone dentipalpis Wid.
E. atra Bl.
Bathyphantes sp. (immature).
Labulla thoracica Wid.

Stemonyphantes lineata Linn.
Meioneta rurestris C. L. Koch.

REFERENCE.

(1) Bristowe, W. S. (1939). *The Comity of Spiders*, I, pp. 155-159, 176.

Plant Ecology at Cripplegate, 1948.

By F. E. WRIGHTON.

Following the preliminary survey and habitat investigation described in the 1947 report, attention has been turned to the possibility of more intensive work. It is plain that the main work should be a study of plant succession, which is best done by selecting certain typical small areas and charting the vegetation therein. These same areas are then examined month by month and all changes noted, new charts being made periodically as they become necessary. As the work proceeds, reasons for these changes are conjectured and attempts made to prove the theories formed.

Two interesting features of the conditions prevailing at Cripplegate are (1) the pollution of the atmosphere by smoke and fumes, and (2) the unusual composition of the soil. Some notes on these, together with an account of the methods that have been used for mapping and charting, form the main subjects of this year's report. A brief example of the type of record made for the various species is also given.

ATMOSPHERIC POLLUTION. The effect of suspended impurities in the air, and of those deposited from the air, cannot be ignored in any study of town vegetation. For many years prior to 1939 a continuous series of observations of the atmospheric pollution were taken at various points in a number of our large towns. The results were published in the form of annual reports by His Majesty's Stationery Office. The nearest observation point to the Cripplegate area was in Golden Lane, less than half a mile from the centre of the sites. Two facts should always be borne in mind when dealing with readings of this type, (1) the conditions may be extremely local and due to pollution from a nearby chimney or factory, and (2) the clearing of such a large area of buildings has undoubtedly improved the atmosphere at Cripplegate. A series of readings taken on the area as it is now, would appear to be the only way to obtain reliable data. The 1939 report can, however, be taken as giving maximum values, which, averaged for one month, are approximately as follows:—

Rainfall 1.5 in. pH (Summer) 5.5. pH (Winter) 4.0.

Insoluble deposits	Tar,	0.59 tons per square mile.
	Carbonaceous	2.60 tons per square mile.
	Ash	6.27 tons per square mile.
Included in soluble matter	Sulphates (SO_3),	2.86 tons per square mile.
	Chlorine (Cl),	1.91 tons per square mile.
	Ammonia (NH_3),	0.28 tons per square mile.
Lime (CaO),		1.90 tons per square mile.
Total solids		21.83 tons per square mile.

It will be noticed that the total weight of solids deposited is some 5½ tons more than that of the impurities shown in detail. This balance would appear to consist of dust raised by traffic, domestic cleaning, wind erosion, rubbish collection, etc. In addition, and of the utmost importance to the ecologist, are countless spores of the Cryptogams, cells of the Algae, and large quantities of pollen in due season. All these are divided broadly into two classes by air filter manufacturers. (1) Dusts, consisting of mineral particles, spores and pollen, and (2) Lint, consisting of organic fibres such as cotton, wool, silk and hair.

As a matter of interest it can be stated that the amount of pollution quoted above is only about half of that experienced in the centres of Birmingham, Liverpool, Newcastle and Rochdale.

Much useful data as to the effect of pollution is given by J. B. Cohen and A. G. Ruston, in *Smoke, a Study of Town Air* (Arnold, 1925). The effects adverse to vegetation have been summed up as follows: (1) reduction of light by suspended particles and also by tarry deposits on leaf surfaces; (2) choking of the stomata by tarry deposits; (3) absorption of sulphur compounds by the leaves, and the corrosion of leaf surfaces; and (4) souring of the soil with a corresponding reduction of bacteria.

Let us now consider how these affect the plants at Cripplegate. (1) Reduction of light by suspended particles would appear to be of little importance as the sites are so open and unshaded. Except in special places such as cellars, lack of light will not be a limiting factor for the species of importance. (2) Cloking of the stomata affects chiefly plants that have to retain their leaves for long periods, i.e., plants of slow growth and evergreens. Most grasses send out leaves in plenty, and fresh stomata are constantly being exposed to supply the plants with carbon dioxide. Plants with hairy leaves are often influenced by tar deposits, but *Hordeum murinum* in the Chiswell St. area seems to be little retarded in any way, as it is spreading rapidly. In general it is safe to say that the plants which suffer most from stomatal choking are not, at present, of great importance in the Cripplegate succession. To the hardy native plants leading up to grassland it is not a limiting factor. (3) Absorption of sulphur can probably be regarded in the same manner, but there may be exceptions; 6% to 9% of the total deposit may be sulphuric acid and possibly causes early leaf fall in some species, but neither this nor corrosion of the leaf surfaces has been definitely

noted. (4) Souring of the soil is of extreme importance in many of our large towns, but the abundance of calcium in the bombed site debris will cancel out this effect for a number of years. Every strong wind distributes calcium particles from the crumbling walls and rubble banks, and every rainstorm carries down calcium salts to the soil below.

On the credit side it can be shown that a certain amount of valuable fertilizer is deposited in the soot, which becomes available under suitable conditions. This is mainly nitrogen and is present in the form of ammonium chloride or ammonium sulphate. The nitrogen content of soot may be as much as 7% of its weight. Assuming that the rate of soot fall is 10 tons per square mile, per month, and that the nitrogen content is 5%, then the fertilizer will be distributed at the rate of $\frac{1}{2}$ ton per square mile, per month, or $\frac{1}{16}$ of an ounce per square yard, per annum. This amount is probably insignificant compared with that derived from decaying organic matter, and from the air.

Two genera which are regarded as good indicators of pollution are *Festuca* and *Cratægus*. These are supposed not to grow if conditions are very bad, and to be retarded by a moderate amount of pollution. Species of *Cratægus* are planted in the churchyards of St Paul's and St Giles, but in no case look healthy. The growth is stunted and no seeds have been observed. *Festuca* is represented by the species *F. rigida* Kunth., *F. rubra* L. and *F. tenuifolia* Sibth. The first, an annual, propagates itself and multiplies. It is extremely local and evidently originates from a single seed source. A number of isolated plants of *Festuca rubra* occur but these have not yet been closely observed. *Festuca tenuifolia* is also very local, but several seedlings have become established and the plants flower well. Another genus often quoted as an indicator is *Trifolium*, and this is well represented on the sites. *T. repens* L. has always been present near to St Giles churchyard, and has now spread out into several large colonies, which set seed and also expand vegetatively. *Trifolium pratense* L. is also quite common, and does not appear to be in any way retarded.

The conclusion to be drawn from the above evidence would seem to be that the amount of pollution experienced in the Cripplegate area is, at present, not sufficient to have any appreciable effect on the native plants that lead up to grassland. It is not suggested, however, that the succession will end as grassland, but there is not yet sufficient evidence available to go beyond this stage.

Soil Origin and Composition. Although the means are not available to enable this subject to be carried to its conclusion, it is of interest to note certain facts in passing. Vegetation will not develop quickly on a bare soil unless certain chemicals are present, or if certain toxic substances are present in too great a quantity. An example of this can be seen on the many spoil heaps from coal mines in the Midlands and elsewhere, which remain bare for a number of years notwithstanding a suitable amount of available seed. At Cripplegate nearly all the plants are rooted in building material in one form or another. This consists mainly of bricks, mortar, concrete and plaster, all of which

are gradually breaking down to their original constituents under the action of weather and of plant excretions. The resulting fine particles which enable plant life to develop are therefore derived from clay (silicates of aluminium and iron oxide), sand (silica), cement (oxides of calcium, silicon, aluminium and iron), and lime (calcium oxide). Owing to the widespread fires that occurred when the area was bombed, an enormous amount of wood from floors, roofs, joinery and furniture, was reduced to ash, and this ash, rich in potassium and magnesium salts, has undoubtedly had a stimulating effect on the growth of plants. In addition the constant deposition of impurities from the air is not without importance. A small amount of nitrogen is deposited in the form of ammonia, but is not important compared with the quantities that can be released by bacteria, either from the air or from decaying organic matter. In addition are deposited compounds of sulphur and chlorine which in the presence of the other elements can form such useful salts as calcium sulphate, magnesium sulphate, and ferric chloride. It is probable that the main sources of phosphorous are: (1) the decaying remains of plants and insects; (2) organic dust from roads consisting of manure and fodder particles; and (3) lint from domestic cleaning, etc. (see above).

Thus, although the presence of a particular chemical does not mean that it is available for plant nutrition, it is highly probable that from the above elements, all the salts necessary for plant growth may be formed. Knops' solution used by botanists for water culture contains only the chemicals mentioned, and is as follows: 0.4 grm. of calcium nitrate, 0.1 grm. each of potassium nitrate, magnesium sulphate and potassium phosphate, 2 drops of ferric chloride and 1 litre of distilled water.

Survey Methods. The study of plant succession necessitates the close observation of a number of typical vegetation samples. These are recorded by charting, and a system of mapping must be developed which will enable any sample to be easily located by the workers concerned, as, obviously, in public places it is impossible to rely on any conspicuous method of labelling on the ground. Apart from the actual locating of samples, each must be numbered so that records can be kept, especially when the number of samples is large. With this in view a map has been prepared to the scale of approximately 25 inches to the mile, which covers the whole of the area under survey. This shows all the streets and the principle landmarks and is of small size (13 × 9 inches) and so is suitable for use on site. Next a series of smaller areas were chosen, each about 100 yards square, and a detail map, showing all the basements and dividing walls, was made for each. These maps are to a scale of approximately 1 inch = 50 feet, the details being measured direct from the sites. Each map is numbered and its location is plotted on the main map mentioned above. In this way any number of detail maps can be brought into use as the scope of the work increases; and their small size renders them easy to produce, and use in the field. On them is marked the positions of all areas and samples selected for special

study, with distances given to permanent features such as roads or walls. All vegetation charts are numbered, and this number and the detail map number, together give the exact location. The conventional method of marking areas by driving in pegs is not very suitable for bombed sites, as in loose rubble they are insecure, and on concrete or asphalt, or when only a shallow soil overlies these materials, they cannot be driven in. This difficulty has, to a large extent, been overcome by a careful selection of the areas for study. Suitable ones can usually be found which are bounded on one or more sides by permanent features of the site, and one or two accurate measurements will then fix the boundaries without doubt. To quote an actual example, a manhole filled with rubble provides a ready-made quadrat, which needs only to be located by measurements on a detail map. A number of square quadrats has been plotted in the usual metric manner, i.e., 1 square metre on the ground = 1 square decimetre on the chart, but it is felt that the use of feet and inches is more convenient and quite as effective; and the apparatus required is obtained more easily.

A difficulty often experienced with surveys in public-places is interference with the vegetation by man. On the bombed sites this is caused by rubbish dumping, by children at play, and by the gathering of Willow Catkins, which is often done by tearing off large parts of the young trees. Eventually the area will be built on, although little has been done so far. To overcome this difficulty, and to enable the work to proceed for as long a time as possible, the vegetation samples selected for study are dispersed widely over the sites, so that, when some are destroyed, work can still be continued at the others.

The employment of a systematic method of survey is of the utmost importance when time is limited and the workers few. It has been found very desirable that the work should be planned before the site is visited, with alternative programmes to suit varying weather conditions. When visiting the samples, as is done each month, much time is saved by using the same route at every visit. In this way the process becomes automatic and nothing is missed.

Typical Species Record. After only twelve months of intensive survey it is perhaps premature to speak of results, but a few remarks to show the general trend of the work may be of interest. Observations are being made on some of the ecologically important species, and the following will show the kind of record that is kept.

Senecio squalidus L. The species has a flowering season of at least from May to early December, and seeds are dispersed from June onwards. In the autumn, wet conditions often prevent the seeds from dispersing, as the pappus does not function when wet. It is possible that the seeds so restricted fall to the ground and germinate when conditions are suitable. Seeds germinate at any time that conditions permit, but it is in the autumn that most seedlings are seen. Germination takes place most readily on a light soil in an open situation, and is very uncertain on clay or in a shady situation. The seeds germinate readily on a moss carpet (usually *Bryum argenteum* at Cripplegate) or

on a damp bed of plant litter, and often grow in close masses, leaf to leaf. The seedlings often winter in a two or four leaf state, and begin to grow as the soil warms in early spring. If rooted in a shallow soil, little development takes place and drought often kills the plants during the next summer, but if the roots find a deeper soil, such as a crack in a concrete floor, the plants will develop according to the moisture available. Most plants of normal size which survive a dry summer are found to be rooted in cracks. On well-drained rubble or Thames gravel the plants may attain full size in a wet season, but will die off in prolonged drought. Few seedlings are seen under plants with reasonable foliage, and although this may be due to seeds not reaching such places in any quantity, it is more likely to be due to lack of warmth or sunlight. This failure to regenerate in shady situations is the main reason why the species is superseded; other plants enter the space under the *Senecio*, often by vegetative means, and render its regeneration quite impossible. On investigating one case where *Senecio* was being overgrown by *Poa trivialis* L. it was found that the branches of *Senecio* lying under the grass, and consequently in a very humid situation, had sent out adventitious roots from the nodes; thus exhibiting a vegetative method of survival where reproduction by seed was impossible. The branches were lying an inch or two above the soil and the roots were still aerial or in contact with the grass only.

The maximum life of a plant is more than two years, and sideshoots develop after the flowering season. The plants thus bear green leaves all the year round, which helps, temporarily, in conserving ground space. Often after a plant appears to be dead, sideshoots will develop low down, on conditions becoming more favourable.

On shallow consolidated rubble, plants have been observed to reach a height of about 4 inches in the spring and then to stop growing because of drought. This condition has continued throughout the summer with a gradual reddening of the leaves, and the loss of the lower ones. With the autumn rain the plants revive, rise to a height of about 9 inches, and flower, and in late October 1948 plants of this type were very conspicuous on the basement floors.

The Survey of Bookham Common.

SEVENTH YEAR.

Progress Report.

STEADY progress can be reported for 1948. Further notes were made by Messrs Bangerter and Castell on the vegetation of Eastern Plain, whilst Mr Norkett continued his observations on the aquatic algae; papers on the colonization of disused gun-pits on Eastern Plain by algae, bryophytes and flowering plants follow this report. Work was continued on plant-galls by Mr Burkill, on beetles by Dr Easton, on flies by Mr Parmenter, and on hymenoptera by Mr Currie. I am indebted to Col. C. J. F. Bensley for his interim report on the Freshwater Mollusca and to Mr P. W. E. Currie for his report on the work done by the ornithological party under his leadership.

Freshwater Mollusca. It was not possible, after September 1947, to carry on the analysis of the fresh-water mollusca started in 1946 because of the dry or almost completely dry condition of the Isle of Wight Pond until the middle of December 1948. On a few occasions there has been a very little much discoloured water by the outlet but no living aquatic plants. This has led to the almost total disappearance of the mollusca but, even so, there were usually one or two live juvenile *Planorbarius corneus* whenever there was any water at all, but no other live species. In December 1948, work was started on the repair of the embankment at the western end of the pond and by December 12th there was a fair amount of water in it. On that date, besides a few young *Planorbarius corneus*, one juvenile *Planorbis planorbis* was found. By the end of the year, a completely new set of conditions obtained. The embankment was completed and the pond filled to overflowing, covering the land vegetation which had invaded most of the pond site. Sampling could not be done from the embankment owing to its width and softness under water, and round the edges the water merely covered terrestrial vegetation which would not attract any of the mollusca which may have persisted in the middle. Another biotic factor is the presence of a flock of a dozen domestic geese which can be guaranteed to keep down the molluscan population of the shallow water. So to all intents and purposes the present Isle of Wight pond is a different pond from the one where the analysis of 1946-1947 was made.

There has also been a general clearing out of ditches and streams throughout the Common which will adversely affect the molluscan population of those habitats. Prior to the clearing out of Central Ditch, *Lymnaea truncatula* was still present but in very small numbers in its

previous locality, but there was no sign of it in Greendell Ditch where it formerly occurred.

It will be seen from the above that great disturbances have occurred and are occurring which are likely to cause a complete redistribution of the fresh-water mollusca in the area and only time will show what those changes may be. Upper Eastern Pond has not been much affected by these changes, so there is a nearby reservoir for about half a dozen species from which repopulation of Lower Eastern and Isle of Wight Ponds can take place. The source of supply of the molluscan population of the streams and ditches in the Central Plain area is probably from the south by way of Bookham Stream.

Birds. Ornithological work has been continued during 1948 with the assistance of a small, but increasing, number of regular helpers. During early spring and the following winter work was concentrated mainly on the resident species of Eastern Wood, with particular reference to the population of Robins. On March 6th almost the whole of the grassy plains to the west of Common Road and north-west of Isle of Wight Road was burnt deliberately to "improve the grass." This resulted in a considerable reduction in cover, all dead grass and bracken being burnt off, and some hawthorn, blackthorn and blackberry bushes being killed or destroyed. Attention was thus drawn to the birds of the plains area, and an attempt was made in late April and in May to map the territories of the breeding species in the whole of the area lying to west of Common Road, excluding the Isle of Wight. A short paper, illustrated with maps, on the results of this effort was read to the Ornithological Section by Mr P. W. E. Currie on September 14th. In an area of about 90 acres, the following approximate numbers of territories were found: Chaffinch 37, Reed Bunting 4, Yellow Bunting 10, Tree Pipit 14, Willow Warbler 25, Grasshopper Warbler 3, Whitethroat 34, as well as a small number of other species. Not all these figures represent breeding pairs, since it was not always possible to verify the presence of females; nor is it claimed that every bird was located. Nevertheless the figures obtained will provide, in future years, a basis of comparison which may make it possible to determine the effect of the burning referred to above. They have already suggested some interesting peculiarities in the habitat preferences of the species involved. An effort will be made to repeat this work in 1949 and the study of Eastern Wood will also be continued.

Freshwater Mollusca. Correction. Before going overseas, Major J L. Harrison handed over to the Sectional Secretary a small collection of freshwater mollusca from the Common. This contained examples of the species referred to in his paper (*L.N.* for 1944, pp. 22-23). Examination of the material, with the help of Mr A. E. Ellis, showed that the following corrections are necessary throughout the paper: for *Planorbis albus* read *Planorbis crista* (L.) and for *Succinea putris* read *Succinea pfeifferi* Rossm.

C. P. C.

The Fungi of Bookham Common.

A SUPPLEMENTARY LIST.

By C. P. Castell, B.Sc.

The following list comprises records of species of fungi additional to those published in the *London Naturalist* for 1946 (1947), pp. 83-87. Most of the records of the larger species are the results of visits of the British Mycological Society in 1947 and 1948 and most of the rest were kindly sent in by Dr R. W. G. Dennis who visited the Common on several occasions I am again indebted to Miss E. M. Wakefield and Dr R. W. G. Dennis of the Kew Herbarium, to Dr J. Ramsbottom, Mrs F. L. Balfour-Browne and Mr J. B. Evans of the British Museum and to Messrs A. A. Pearson and J. M. B. King for their help in the compilation of the list and in the identification of specimens.

The month and year of all records are given in figures. Numbers in square brackets are grid references to the base maps. The following abbreviations are used—B., Bayfield; C., Central; H., Hollow; K., Kelsey's; Wd., Wood.

The nomenclature is that adopted in the lists of groups of British fungi published in the *Transactions of the British Mycological Society*: —Bisby, G. R., and Mason, E. W. Pyrenomycetes. 1940. Vol. 24, pp. 127-243; Wakefield, E. M., and Bisby, G. R. Hyphomycetes. 1941. Vol. 25, pp. 49-126; Pearson, A. A., and Dennis, R. W. G. Agarics and Boleti. 1948. Vol. 31, pp. 145-190.

MYXOMYCETES (MYCETOZOA).

Lycogala epidendron Fr., 10/48.

PHYCOMYCETES.

Peronospora alsinearum Casp. on *Stellaria media* (L.) Vill., 11/44.

ASCOMYCETES.

ERYSIPHALES.

Erysiphe graminis DC. on *Dactylis glomerata* L. and *Festuca rubra* L., 11/44.
Sphaerotheca pannosa (Wallr.) Lév. on *Rosa*. C.Wd., 10/47.

DISCOMYCETALES.

Otidea leporina (Batsch) Fuckel, 11/48.
Ascobolus stercorarius (Bull.) Schroet. [*furfuraceus* Pers.] on rabbit droppings, 2/45.
Coryne sarcoides (Jacq.) Tul., E. Plain, 8/48.
Orbilia leucostigma Fr., dead wood, E. Plain, 7/48.
Helotium [*Phialea*] *cyathoideum* (Bull.) Karst.) on *Cirsium palustre* (L.) Scop., 7/48.
H. fructigenum (Bull.) Fuckel on acorns, H.Wd., C.Wd., 10/47.
H. lutescens (Hedw.) Fr., on dead *Molinia*, E. Plain, 6/43.
Dasyscypha conformis (Cooke) Sacc. on *Juncus conglomeratus* L., 8/48.
D. luteola (Curr.) Sacc., E. Plain, 8/48.
D. diminuta (Rob.) Sacc. on *Juncus*, 7/48.
D. rhytismatis (Phill.) Sacc., 7/48.
D. carneola Sacc. var. *longispora* Dennis on *Holcus*, *Dactylis* and *Deschampsia*, 7/48.
Lachnella albo-testacea (Desm.) Quél. on *Holcus*, 7/48.

Belonoscypha vexata (de Not.) Rehm. on grass stems, 7/48.
Erinella juncicola (Fuckel) Sacc. on rotton *Juncus*, 11/44, 2/45.
Stegia [*Trochila*] *ilicis* Fr. on dead *Ilex leaves*, C.Wd., 10/47.
Pseudopeziza trifolii (Biv.-Bern.) Fuckel on *Trifolium repens* L. and *T. pratense* L., 11/44.
Rhytisma acerinum (Pers.) Fr., common every year on Sycamore leaves.

PYRENOMYCETES.

Nectria cinnabarina (Tode ex Fr.) Fr., K.Wd., 10/47.
Apiocrea [*Hypomyces* (*Sepedonium*)] *chrysosperma* (Tul.) Syd. on *Boletus*, H.Wd., 10/47.
Claviceps purpurea (Fr.) Tul. on *Molinia*, E. Plain, 10/47.
Rhopographus filicinus (Fr.) Fuckel on bracken, 2/45.
Systremma ulmi (Duval ex Fr.) Theiss. et Syd., C.Wd., 10/47.
Endodothella cf. *junci* (Fr.) Theiss. et Syd. on dead *Juncus*, 2/45.
Phyllachora sylvatica Sacc. & Speg. on *Festuca* sp., 11/44.
Trichosphaeria myriocarpa (Fr.) Petrak & Syd., 2/45.
Rosellinia velutina Fckl. rotten oak-wood, 2/45.
Leptosphaeria acuta (Hoffm. ex Fr.) Karst. on dead *Urtica*, 2/45.
Ophiobolus acuminatus (Sow. ex Fr.) Duby. on dead *Cirsium palustre* (L.) Scop., 2/45.
Coleroa chaetomium (Kunze ex Fr.) Rabenh. on *Rubus*, 11/44.
Diaporthe leiphaemia (Fr.) Sacc. on dead oak, 11/44.
Anthostoma decipiens (DC. ex Fr.) Nils., E. Plain, 7/48.
Cryptospora corylina (Tul.) Fuckel on dead hazel branch, 2/45.
Melanconis stilbostoma (Fr.) Tul., dead birch, 11/44.
Diatrype stigma (Hoffm. ex Fr.) Fr., 10/44.
Diatrypella quercina (Pers. ex Fr.) Cooke, common, 10/44.
Cryptodiaporthe salicina (Currey) Wehm. on dead willow, 2/45.

BASIDIOMYCETES.

USTILAGINALES—UREDINALES.

Ustilago violacea (Pers.) Tul. on *Stellaria graminea* L., 10/44.
Melampsorella caryophyllacearum (DC.) Schroet. on *Stellaria graminea* L., 11/44.
Melampsoridium betulinum (Pers.) Kleb. on birch, 11/44.
Coleosporium euphrasiae (Schum.) Wint. on *Odontites rubra* Gilib. (*Bartsia odontites* (L.) Huds.), E. Plain, 9/48.
Ochropsora [*Uredo*] *ariae* (Fuckel) Syd. on *Deschampsia caespitosa* (L.) Beauv., 11/44.
Kuehneola albida (Kühn) Magn. on *Rubus*, 10/48.
Phragmidium violaceum (Schultz) Wint. on *Rubus*, 11/44.
P. disciflorum (Tode) James [*mucronatum* Fr.] on *Rosa canina* L. agg., 11/44.
Uromyces dactylidis Otth. on *Dactylis glomerata* L., 11/44.
Puccinia millefolii Fuckel on *Achillaea millifolium* L., 11/44.
P. obtegens Tul. on *Cirsium arvense* (L.) Scop., 11/44.
P. menthae Pers. on *Mentha* sp., 11/44.
P. violae (Schum.) DC. on *Viola* "*canina*," 11/44.
P. acetosae (Schum.) Koern. on *Rumex acetosa* L., 11/44.
P. leontodontis Jacky. on *Leontodon autumnalis* L., 11/44.
P. coronata Corda on *Agrostis* sp., *Arrhenatherum* sp. and *Holcus* sp., 11/44.
P. festucae Plowr. on *Festuca rubra* L., 11/44.
P. caricis (Schum.) Reb. on dead *Carex* sp., 2/45.
P. cirsii Lasch. on *Cirsium palustre* (L.) Scop., 10/44.
P. lychnidearum Link forma *areniarae* (Schum.) Gr. on *Stellaria graminea* L., E. Plain, 8/48.

AGARICALES.

Amanita excelsa F. [*spissa* Fr.] under oak, 7/48.
Tricholoma sordidum (Schum.) Fr., 11/48.
Russula lauro-cerasi Melz., 10/48.
R. xerampelina (Schaeff.) Fr. under oak, 7/48, 10/48.
R. pseudo-integra Am. & Goris, C.Wd., 9/48.

R. emetica (Schaeff.) Fr., 10/48.
R. atro-purpurea Kromb. var. *depallens* (Cke.) Maire under oak, 7/48.
Mycena inclinata Fr. [*galericulata* (Scop.) Fr. var. *calopus* Fr.] H.Wd., 11/47.
M. stylobates (Pers.) Fr., 10/48.
Collybia fusipes (Bull.) Berk., C.Wd., 10/47.
Marasmius rotula (Scop.) Fr., H.Wd., 10/47, 10/48.
M. [*Collybia*] *confluens* (Pers.) Karst., 10/48.
Lactarius torminosus (Schaeff.) Fr., 10/48.
Hygrophorus penarius Fr., 10/48.
Clitocybe odora (Bull.) Fr., C.Wd., 10/47, 10/48.
C. aurantiaca (Wulf.) Studer, C.Wd., 10/47; B.Pl., 11/47, 12/47.
Var. *lacter* (Quél.) Rea, 10/47.
C. tabescens (Scop.) Bres., 10/48.
C. cerussata Fr. [*tornata* Fr.], 10/48.
C. vibecina Fr., 11/48.
Omphalia hydrogramma (Bull.) Fr., 10/48.
Panus torulosus (Pers.) Fr., 10/47.
Pluteus coccineus (Masse) Lange, 10/48.
Leptonia sericella (Fr.) Quél. [*Clitopilus carneo-albus* (With.) Fr.], 11/48.
Pholiota erinacea (Fr.) Quél. on hawthorn twigs, 7/48.
Bolbitius vitellinus (Pers.) Fr., 10/48.
B. titubans (Bull.) Fr., 10/48.
Inocybe asterospora Quél., 10/47.
Hypholoma candolleanum Fr., 10/47.
Panaeolus papilionaceus Bull.) Fr., 11/48.
Psathyrella atomata Fr., C.Wd., 10/47.
P. [*Psathyra*] *fibrillosa* (Pers. ex Fr.) Pearson & Dennis, 10/47.
Psilocybe sub-ericaea Fr., dried mud, K. Pond, 10/47.
Coprinus atramentarius (Bull.) Fr., 10/47, 10/48.
C. cinereus (Schaeff.) Fr., 11/48.
C. micaceus (Bull.) Fr., 10/48.
C. lagopus Fr., C.Wd., 10/47.
Boletus chrysenteron (Bull.) Fr., 10/47, 10/48.
B. versicolor Rostk., 10/47.
B. impolitus Fr. under hawthorn [76], 10/47.
B. queletii Schulz. [*erythropus* (Pers.) Quél.] under oak, 7/48, 10/48.
B. crocipodius Letell. (*nigrescens* Roze & Rich.), 10/47.

APHYLLOPHORALES.

Polyporus squamosus (Huds.) Fr., C.Wd., 10/47.
P. rutilans (Pers.) Fr., H.Wd., 10/47.
Merulius rufus (Pers.) Fr., H.Wd., 10/47.
Mucronella aggregata Fr., dead wood, E. Plain, 7/48.
Fistulina hepatica (Huds.) Fr., S.E.Wd., 10/47.
Radulum molare Fr., dead oak branch, H.Wd., 10/47.
Acia uda (Fr.) Bourd. et Galz., E. Plain, 8/48.
Hypochnus [*Tomentella*] *fuscus* (Fr.) Quél., 11/44.
Corticum laeve (Pers.) Quél., E. Plain, 8/48.
C. sambuci (Pers.) Fr., K.Wd., 10/47.
C. confluens Fr., 10/47.
C. roseo-cremeum Bres., 10/47.
C. praetermissum (Karst.) Bres., 10/47.
Peniophora hydnoides Cke. et Mass., C.Wd., 10/47; E. Plain, 7/48.
P. cinerea (Fr.) Cke., on hazel, C.Wd., 10/47.
Clavaria vermicularis Fr., amongst grass, 7/48.
C. juncea (A. et S.) Fr., E. Plain, 11/48.
Pistillaria puberula Beck., dead bracken, E.Wd. [67] and E. Plain, 11/47.

TREMELLALES.

Sebacina incrustans (Pers.) Tul.. (*Thelephora sebacea* (Pers.) Fr.), rotten birch log, E. Plain, 2/48; E. Plain, 8/48.

GASTEROMYCETALES.

Lycoperdon caelatum (Bull.) Fr., S.E.Wd., 10/47, 10/48.
L. hiemale Bull. (*depressum* Bon.), S.E.Wd., 10/47.
L. umbrinum Pers., 10/48, 11/48.
Sphaerobolus stellatus (Tode) Pers. on ground, E. Plain, 8/48.

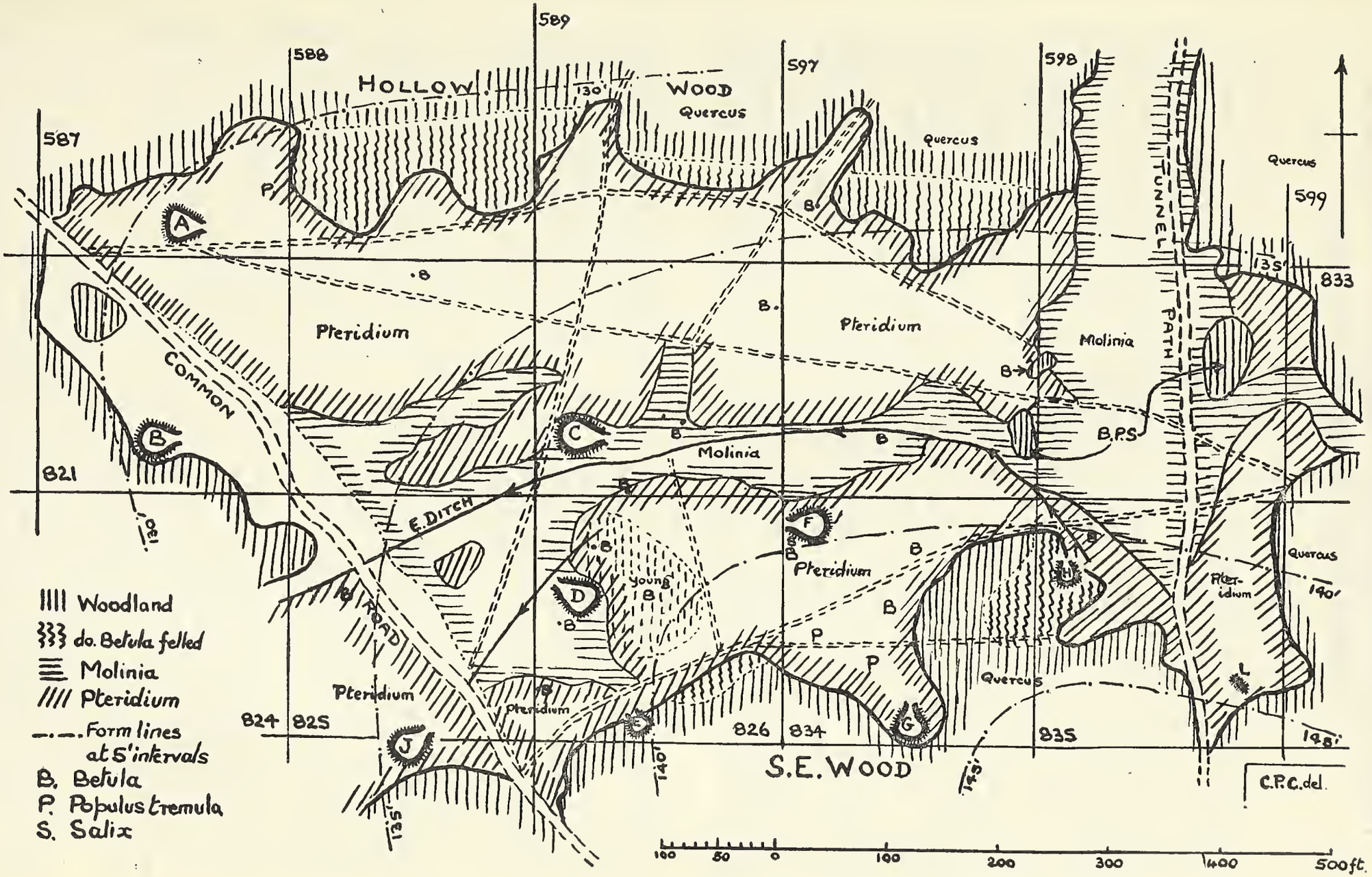
FUNGI IMPERFECTI.

Aposphaeria agminalis Sacc. on decorticated rose wood, 11/44.
Ascochyta equisiti Grove on dead *Equisetum*, 2/45.
Septoria stellariae Rob. & Desm. on *Stellaria media* (L.) Vill., 11/44.
Myxosporium roumegueri Sacc. on dead hazel branch, 2/45.
Cylindrium cylindricum (Corda) Lindau. on dead oak leaves, 11/44.
C. flavovirens (Ditm.) Bonord. on dead oak leaves, 11/44.
Trichoderma viride Pers. ex Fr. [*lignorum* (Tode) Harz.] on dead oak wood, 11/44; E. Plain, 8/48.
Ovalaria obliqua (Cke.) Oudem. on *Rumex* sp., 10/44.
Ramularia lactea (Desm.) Sacc. on *Viola* " *canina*," 11/44.
R. sp. on *Glechoma hederacea* L., 10/44.
Helicoma phaeosporium Fres. on rotten wood, 11/44.
Bispora monilioides Corda on cut surface of stump, 2/45.
Dendryphium curtum B. et Br. on dead *Urtica* leaves, 11/44.
Isaria farinosa Fr., H.Wd., 10/47, 10/48.
Aegerita candida Pers. ex Fr., C.Wd., 10/47; E. Plain, 7/48.
A. alba (Preuss) Sacc., E. Plain, 7/48. [New to Britain, see below].

A Fungus New to Britain. A fungus found on decaying *Rubus* leaves in a pond " Pit A " on Eastern Plain in July 1948 by Mr A. H. Norkett was submitted to Mrs F. L. Balfour-Browne who has contributed the following note: " The fungus appears to be *Aegerita alba* (Preuss) Sacc., but the descriptions in the literature are not very precise. A new record for Great Britain. The fruit bodies are gregarious, more or less spherical, white, $\frac{1}{4}$-$\frac{1}{2}$ mm. diam.; conidiophores radiating in all directions, septate, torulose, short, 30 × 10μ approx.; conidea, representing the terminal swellings of the conidiophores and remaining permanently attached, hyaline, more or less globose, 12-18μ diam."

Corrections. The following corrections should be made to the previous list (*L.N.* for 1946): For *Phyllacteria* read *Phylacteria* (p. 86), for *gausopatum* read *gausapatum* (p. 86, line 6 from bottom), for *kuntzei* read *kunzei* (p. 87, line 1), and for *inequalis* read *inaequalis* (p. 87, line 5).

Miss E. M. Wakefield points out that the British fungus which in the past has been recorded under the name of *Entoloma jubatum* Fr. (p. 85) is *E. porphyrophaeum* Fr., and that the true *E. jubatum* Fr. has not yet been recorded in this country. *Phylacteria terrestris* (Ehrh.) Big. & Guill. (p. 86) should be known as *Thelephora terrestris* Ehrh. ex Fr.



EASTERN PLAIN, SHEWING POSITIONS OF GUN-PITS AND TRENCHES.

Notes on the Vegetation of Gun-pits and Trenches on Eastern Plain, Bookham Common.

By E. B. Bangerter and C. P. Castell.

In the winter of 1943-1944, gun-pits, about 30 feet across and two to three feet deep were dug in Eastern Plain for army training purposes; each had a sloping entrance and a low parapet, about two feet above ground level, round the rest of the pit. Trenches some four feet deep were also dug. Scattered observations have been made on all of the gun-pits and on two of the trenches; their position in and relation to the vegetation of Eastern Plain is shown on the accompanying sketch map. Pits E and H, 20 feet or less across, are smaller than the rest.

Eastern Plain slopes down to the north and to the west and instrumental levelling showed that pits A and B are about nine feet lower than G and H. Most of the pits show about one foot of soil resting on sandy loam, often with flint pebbles up to three inches in diameter. The bottom of pit A, however, is in sticky clay, whilst that of J is in sand. Although all the pits hold some water in the winter, they are merely damp or quite dry in late summer and autumn. In 1948, pit H and trench L were dry throughout the year; on the other hand, a little water remained in pits A and B until September and reappeared in December. pH. readings taken in May 1947 ranged from 5.1 for trench L to 6.4 in pit E.

A list of the flora of the pits will be found at the end.

Pit A is surrounded by bracken, with brambles on the W. and S. margin, and with the entrance facing E. The soil is a sticky clay and the pit is one of the least colonized. In 1948, *Juncus effusus* was frequent but scattered over the floor. A few mosses and liverworts were colonizing the slope, they included *Dicranella heteromalla, Atrichum undulatum, Aneura sinuata* and *Cephalozia bicuspidata*. The pit is of special interest as yielding the fungus, *Aegerita alba* (see p. 50).

Pit B is sheltered by trees on the W. and S. sides, and somewhat exposed on the N.E.; the entrance faces E. In April 1945, the entrance slope was being colonized by the mosses *Atrichum undulatum, Dicranella heteromalla, Pleuridium acuminatum* and *Bryum* spp., and by September 1945 *Mentha* cf. *arvensis*, and *Hypericum humifusum* had appeared in the pit. In April 1948, the pit showed an abundance of *Juncus effusus* with *Ranunculus flammula, Hypericum humifusum, Callitriche stagnalis, Lotus uliginosus, Hydrocotyle vulgaris, Mentha* cf. *arvensis, Juncus articulatus* (s.l.), and *Carex* sp., with the bryophytes *Aneura sinuata, Fossombronia wondraczeki*, and *Hypnum cuspidatum*. An interesting occurrence was that of *Centunculus minimus* found by Mr Norkett on the entrance slope in January 1949.

Pit C lies in the middle of Eastern Plain with bracken on the N., and a ditch and Molinia to the S. A footpath runs nearby to the W. The entrance faces E. In April 1948, the community on the floor was still fairly open and consisted of *Ranunculus flammula, R. repens, Hydrocotyle vulgaris, Mentha* sp., and *Molinia caerulea* (probably

thrown in) and on the slope *Juncus articulatus* (s.l.) and *Lotus uliginosus*. At the margins of the pit, *Molinia caerulea* was dominant and *Carex nigra* L. (=*goodenovii*) locally abundant. The thrown-up material forming the parapet supports a more varied flora than in any other pit, possibly because of its open position and the proximity of the footpath and ditch. Those species occurring on the parapet but not in the pit are marked P in the appended list. *Hypnum cuspidatum* is the only recorded bryophyte.

Pit D is surrounded by bracken with scattered birches and willows. The entrace faces N.W. *Juncus effusus* is dominant on the floor and on the sides of the pit—*Dicranella heteromalla* and *Atrichum undulatum*; the latter is dying out under the shade of bracken.

Pit E lies on the N. edge of S.E. Wood, almost surrounded by trees, with birches at the entrance which faces N.N.W., and with a path nearby to the N. The vegetation is open with scattered flowering plants, but mosses are conspicuous especially an abundance of *Polytrichum formosum*.

Trench E is a few yards S. of Pit E and just within S.E. Wood. The sides are covered with bryophytes, mostly *Dicranella heteromalla* and *Atrichum undulatum*, together with *Polytrichum aloides*, *Pellia epiphylla*, *Lophocolea bidentata*, and *Calypogeia fissa*.

Pit F lies in the middle of the Plain, surrounded by bracken and with its entrance facing W. It supports an open community of *Juncus effusus* and *J. articulatus* (s.l.) and a belt of *Hydrocotyle vulgaris* along its margin. *Dicranella heteromalla* is abundant on the sides.

Pit G lies in an embayment of S.E. Wood, surrounded by trees and bracken and with its entrance facing N. By April 1944 colonization by the following mosses had begun—*Pleuridium acuminatum* (ab.), with *Atrichum undulatum* and *Webera nutans*. In 1948, *Dicranella heteromalla* was dominant on the sides with *Atrichum undulatum* and *Polytrichum aloides*. On the floor *Rubus fruticosus* (agg.) was spreading in from outside, accompanied by *Betula* sp., *Hypericum humifusum*, *Potentilla erecta*, *Juncus effusus* and the moss *Brachythecium purum*.

Pit H is surrounded by trees on the W. and S. sides and by bracken on the N. and E. sides; the entrance faces N. In 1948, the only flowering plants present were *Juncus* cf. *effusus* and young *Betula* and *Salix* cf. *atrocinerea* at the entrance. On the floor were the mosses *Atrichum undulatum*, *Polytrichum formosum*, *Bryum atropurpureum* (on a brick), *Webera nutans*, and the liverwort, *Fossombronia pusilla*. It is one of the poorest, floristically, of the pits.

Pit J is surrounded by bracken, with a clearing of birches to the S., and young trees stretching towards the path 40 feet away to the N.E. The entrance faces N.E. The soil is the sandiest, an ironstained sand much coarser than in the other pits. *Juncus effusus* was the dominant plant on the floor and the vegetation, although open and with each species in small quantity, is the most varied among the pits.

The bryophytes, *Dicranella heteromalla* and *Atrichum undulatum* were both abundant on the banks, whilst *Pleuridium acuminatum*, *Ceratodon purpureus*, *Bryum atropurpureum*, *Brachythecium rutabulum*, *Hypnum aduncum*, and *Fossombronia* sp. occurred on the floor.

A most interesting discovery was made in this pit in November 1948, by Mr A. H. Norkett of the liverwort *Eucalyx hyalinus*, a species hitherto unrecorded for Surrey and previously known in the Thames Province only from E. Sussex and Hertfordshire. Since them, however, the species has been recorded for Berkshire and Oxford, and possibly it may be extending its range.

Trench L is entirely shaded by bramble and bracken in the summer and autumn.

The appended list of species found in the gun-pits is somewhat sketchy, but it is hoped that more intensive work on the vegetation of Eastern Plain (a Molinietum being rapidly invaded by *Pteridium* and woodland scrub) will enable the species of critical genera to be diagnosed and others checked. It is sufficiently detailed, however, to show that the pits are being colonized by the plants immediately around them; although many of the pits remain under water most of the year, no sign of an aquatic flora has appeared and species usually associated with pond margins are not in evidence unless they appear on the Plain, e.g. *Ranunculus flammula*. This is in marked contrast with the more permanent ponds in bomb-craters elsewhere on the Common. *Juncus* spp., particularly *effusus*, seem to be the principal colonisers, with *Potentilla erecta* appearing in most pits. The position of each pit in relation to the general vegetation of the Plain seems to determine the richness of its flora, e.g. Pit A, surrounded by bracken and in an open area has only *Juncus*, whereas Pit J, near the belt of varied vegetation alongside Common Road, has the greatest number of species. In many of the pits, especially those near S.E. Wood, trees such as birch, willow and oak are spreading, and in pits E and G, on the edge of this wood, the presence of the woodland species, *Viola riviniana*, gives evidence of colonization from that quarter as well as from the Plain.

The nomenclature used for flowering plants is that adopted by the British Ecological Society in A. R. Clapham—*Check-List of British Vascular Plants*, 1946, *Journ. Ecol.*, Vol. 33, pp. 308-347; that used for bryophytes is that adopted by the British Bryological Society in their *Census Catalogues of British Mosses* (1926) and *British Hepatics* (1930) with the modifications recommended by H. N. Dixon in *Rep. Brit. Bryol. Soc.*, 1938.

FLORA OF GUN-PITS ON EASTERN PLAIN, 1948.

	A	B	C	D	E	F	G	H	J
Ranunculus flammula L.	–	+	+	–	–	–	–	–	+
Ranunculus repens L.	–	–	+	–	–	–	–	–	+
Viola riviniana Rchb.	–	–	–	–	+	–	+	–	–
Sagina procumbens L.	–	–	–	–	–	–	–	–	+
Hypericum humifusum L.	–	+	–	–	+	–	+	–	+
Trifolium dubium Sibth.	–	–	–	–	–	–	–	–	+
Lotus uliginosus Schk.	–	+	+	–	–	–	–	–	–
Potentilla erecta (L.) Rausch	–	+	+	+	+	+	+	–	+
Potentilla anserina L.	–	+	–	–	–	–	–	–	–
Potentilla reptans L.	–	–	P	–	–	–	–	–	–
Callitriche sp. (?*stagnalis* Scop.)	–	+	–	–	–	–	–	–	–
Chamaenerion [*Epilobium*] *angustifolium* (L.) Scop.	–	–	–	+	–	–	–	–	–
Hydrocotyle vulgaris L.	–	+	+	+	+	+	–	–	+
Galium saxatile L.	–	–	–	+	–	–	–	–	–
Galium palustre L.	–	–	–	–	–	–	–	–	+
Galium uliginosum L.	–	+	–	–	–	–	–	–	–
Succisa pratensis Moench [*Scabiosa succisa*]	–	–	P	–	–	–	–	–	–
Gnaphalium uliginosum L.	–	+	–	–	–	–	–	–	–
Cirsium palustre (L.) Scop.	–	+	–	+	+	–	–	–	+
Cirsium dissectum (L.) Hill [*pratensis*]	–	–	–	–	–	+	–	–	–
Cirsium vulgare (Savi) Ten. [*lanceolatum*]	–	–	P	–	–	–	–	–	–
Hieracium pilosella L.	–	–	–	–	–	+	–	–	–
Hypochaeris radicata L.	–	+	+	–	–	+	–	–	+
Taraxacum sp.	–	–	P	–	–	–	–	–	–
Centunculus minimus L.	–	+	–	–	–	–	–	–	–
Odontites rubra Gilib. [*Bartsia odontites*]	–	–	–	–	–	–	–	–	+
Mentha sp. (? *arvensis* L.)	–	+	–	–	–	–	–	–	+
Prunella vulgaris L.	–	–	P	–	–	–	–	–	–
Plantago lanceolata L.	–	–	P	–	–	–	–	–	–
Rumex acetosella L.	–	–	–	–	–	–	–	–	+
Rumex acetosa L.	–	–	P	–	–	–	–	–	–
Betula spp. (mostly seedlings)	–	–	–	+	+	–	+	–	–
Quercus robur L.	–	–	–	+	–	–	–	–	–
Salix sp.	–	–	–	+	–	–	–	+	–
Juncus effusus L.	+	+	+	+	+	+	+	+	+
Juncus conglomeratus L.	+	–	+	+	+	–	–	–	+
Juncus bulbosus L.	+	+	+	+	+	+	–	–	+
Juncus articulatus L. s.l.	+	+	+	–	+	+	–	–	–
Juncus acutiflorus Hoffmn.	–	–	+	–	+	–	–	–	+
Carex nigra L. [*goodenovii*]	–	–	+	–	–	–	–	–	–
C. cf. *tumidicarpa* Anderss.	–	–	+	–	–	–	–	–	–
C. flacca Schreb.	–	–	P	–	–	–	–	–	–
C. hirta L.	–	+	+	+	+	+	–	–	–
Agrostis canina L.	–	–	P	–	–	–	–	–	–
Agrostis canina L. v. *fascicularis*	–	–	–	–	–	–	–	–	+
Agrostis tenuis Sibth.	–	+	–	–	–	–	–	–	–
Agrostis sp.	–	–	–	–	–	–	–	–	+
Deschampsia caespitosa (L.) Beauv.	–	–	P	–	–	–	–	–	–
Holcus lanatus L.	–	–	–	–	–	–	–	–	+
Sieglingia decumbens (L.) Bernh.	–	–	–	–	–	–	–	–	+
Molinia caerulea (L.) Moench	–	–	+	+	–	–	–	–	+
Festuca sp.	–	–	–	–	–	–	–	–	+
Pteridium aquilinum (L.) Kukn.	–	–	P	–	–	–	–	–	–
Equisetum arvense L.	–	–	P	–	–	–	–	–	–

BRYOPHYTES.

MOSSES.	Trench A	B	C	D	E	E	F	G	H	J
Atrichum [*Catharinea*] *undulatum* (Hedw.) P. Beauv.	+	+	–	+	+	+	–	+	+	+
Polytrichum aloides Hedw.	–	–	–	–	+	+	–	+	–	+
P. formosum Hedw.	–	–	–	–	+	–	–	+	+	–
Pleuridium acuminatum Lindb. [*subulatum* Raben.]	+	+	–	+	+	–	+	+	–	+
Ceratodon purpureus Brid.	–	–	–	–	–	–	–	–	–	+
Dicranella heteromalla Schp.	+	+	–	+	+	+	+	+	–	+
Ephemerum serratum Hampe.	–	+	–	–	–	–	–	–	–	–
Webera nutans Hedw.	–	–	–	–	–	–	–	+	+	–
Bryum caespiticium L.	+	+	–	–	–	–	–	–	–	–
B. erythrocarpum Schwaeg.	+	+	–	–	+	–	–	+	–	–
B. atropurpureum W. & M.	–	+	–	–	–	–	–	–	+	+
Brachythecium rutabulum B. & S.	–	–	–	–	–	–	–	–	–	+
B. purum Dixon	–	–	–	–	–	–	–	+	–	–
Hypnum aduncum Hedw.	–	–	–	–	–	–	–	–	–	+
H. cuspidatum L.	–	+	+	–	–	–	–	–	–	–
LIVERWORTS.										
Aneura sinuata (Dicks.) Dum.	+	+	–	–	–	–	–	–	–	–
Pellia epiphylla (L.) Corda	–	–	–	–	–	+	–	–	–	–
Fossombronia pusilla (L.) Dum.	–	–	–	–	–	–	–	–	+	+
F. wondraczeki (Corda) Dum.	–	+	–	–	–	–	–	–	–	+
Eucalyx hyalinus (Lyell) Breidh.	–	–	–	–	–	–	–	–	–	+
Cephalozia bicuspidata (L.) Dum.	+	–	–	–	–	–	–	–	–	+
Lophocolea bidentata (L.) Dum.	–	–	–	–	–	+	–	–	–	–
Calypogeia fissa (L.) Raddi.	–	–	–	–	–	+	–	–	–	–

Some Preliminary Remarks and List of the Algae Found on Eastern Plain, Bookham Common, 1947-8.

By A. H. Norkett.

Whilst making preliminary investigations into the algal flora of the Common in 1946, I noticed an abundance of algae in the gun pits and trenches dug early in 1944 on Eastern Plain. The following list is the result of monthly investigations made in 1947-8 into the distribution and seasonal cycle of the algae in some of these pits.

When the depth of water in the pits was not too great, I waded into them, in order to obtain as great a variety of specimens as possible from the bottom, from submerged plants and also from the surface of the water. As much as possible of the tubed material was examined when fresh, either the same evening if time permitted, or within a day or two, the rest being fixed in dilute formalin for future study. It was not possible in the time at my disposal to name all the algae present in the collections. Representative slides from each gathering were examined, and the more conspicuous, interesting, dominant, or easily named algae were studied whilst those which needed special methods for their identification (e.g., Diatomaceae) or were without zygospores had to be left.

In Pit A, which seemed best to demonstrate periodicity among its filamentous algae, three phases were observed during the year when there was water in the pit.

(a) Winter phase, with *Microspora* dominant.
(b) Spring phase, *Zygnema* and *Oedogonium* dominant.
(c) Summer phase, with high water concentration, Myxophyceae with *Cylindrospermum stagnale* Born. & Flah.

The nomenclature used is that adopted in the following works:—

G. S. West and F. E. Fritsch, *British Freshwater Algae*, 1927.
W. West and G. S. West, *British Desmidiaceae*, Vols. I-IV, 1904-11.
G. S. West and N. Carter, *British Desmidiaceae*, Vol. V, 1923.
A. Pascher, *Die Süsswasserflora Deutschlands, Osterreichs und der Schweiz* (various volumes, 1913-1925).

LIST OF ALGAE.

ISOKONTAE.

VOLVOCALES.	Pit.	Month.
Chlamydomonas sp.	A	January 1948.
,,	F	February 1948.
,,	J	April 1948.
Gonium sociale (Duj.) Warming	F	March 1948.
Pandorina morum (Müll.) Bory	H	March 1947.
Palmodictyon varium (Naeg.) Lemm.	B	May 1948.
,, *viride* Kütz.	L	May-June 1947.
(This was the dominant alga in pit L during the period and imparted a reddish colouration to the water. Ph. 5.1.)		
Sphaerocystis Schroeteri Chod.	D	March 1947.
,, ,,	H	May 1947.
,, ,,	B	March 1948.
Asterococcus superbus (Cienk.) Scherffel	L	May-June 1947.
,, ,,	B	May 1948.
Gloeocystis gigas (Kütz.) Lagerh.	B, L	May 1947.
,, ,,	B	May 1948.
,, ,,	L	June 1947.
,, ,,	E	July 1947.
,, *vesiculosa* Naeg.	J	July 1947.
,, ,,	J	November 1947. (damp ground)
Dactylothece Braunii Lagerh.	A	January 1948.
CHLOROCOCCALES.		
Characium Sieboldii A. Br.	L	May 1947.
Chlorochytrium Facciolae (Borzi) Bristol	B	August 1948.
Chlorella sp. ?	F	May 1947.
Trochiscia aspera (Reinsch) Hansg.	G	May 1947.
,, ,,	A	May 1948.
Oocystis elliptica West	F	April 1947.
,, ,,	B	May 1948.
,, *solitaria* Wittr.	F	April 1947.
Ankistrodesmus falcatus (Corda) Ralfs	F	April 1947.
,, ,,	L	May 1947.
,, ,,	B	May 1947, May 1948.
Scenedesmus bijuga (Turp.) Lagerh.	F	June 1947.
ULOTHRICALES.		
Ulothrix aequalis Kütz.	L	May-June 1947.
,, *moniliformis* Kütz.	H	April 1947.
,, ,,	E	May 1947.
,, *zonata* (Web. et Mohr) Kütz.	H	April 1947.
Hormidium flaccidum (Kütz.) A. Br.		
(Terrestrial and aquatic forms in most pits in most months.)		

Geminella sp. ?	A	March 1948.
Microspora amoena (Kütz.) Lagerh.	A	February 1948.
,, *floccosa* (Vauch.) Thur.	A	February 1948.
Microspora sp.	A	January 1948.
Cylindrocapsa involuta Reinsch ?	B	May 1948.
Rhizoclonium hieroglyphicum Kütz.	A	June 1947.
CHAETOPHORALES.		
Chaetophora elegans (Roth) Ag.	E	June 1947.
Gongrosira viridis Kütz.	A	January 1948.
Microthamnion Kützingianum Naeg.	H	February 1948.
OEDOGONIALES.		
Oedogonium cryptoporum Wittr. ?	A	May 1947.
,, sp.	A	February 1948.
		May 1948.
		June 1947.
CONJUGATAE.		
Debarya laevis (Kütz.) W. & G. S. West	L	May-June 1947.
Mougeotia gracillima (Hass.) Wittr.	L	May 1947.
,, sp.	F	April 1947, May 1947.
	J	July 1948.
	B	May 1948.
Spirogyra tenuissima (Hass.) Kuetz.	L	May-June 1947.
Zygogonium ericetorum Kütz.	J	September-November 1948. (damp ground)
Zygnema insigne (Hass.) Kütz.	A	March 1948.
,, sp.	H	April 1947.
	A	January-February 1948.
(DESMIDIACEAE).		
Mesotaenium sp.	H	February 1948. (damp ground)
Penium cucurbitinum Biss.	B	March 1948.
Closterium Lunula Ehrenb.	F	June 1947.
,, *Ehrenbergii* Menegh. ?	G	May 1947.
,, *Dianae* Ehrenb.	F	April 1947.
,, *Venus* Kütz.	H	April 1947.
,, ,,	B	March 1948.
,, *Kuetzingii* Bréb. (with zygospores)	L	May 1947.
,, *rostratum* Ehrenb.	L	May-June 1947.
,, ,, (with zygospores)	H	May 1947.
,, sp.	F	April 1947.
Cosmarium connatum Bréb.	B	March 1948.
,, *subcucumis* Schmidle	E	June 1947.
,, *pachydermum* Lund.	H	April 1947.
,, *reniforme* (Ralfs) Arch.	H	April 1947.
,, *cucurbitinum* (Biss) Lütk.	H, J	April 1947.
,, *botrytis* Menegh.	B	May 1948.
,, *ochtodes* Nordst.	B	May 1948.
,, *biretum* Bréb.	B	May 1948.
,, ,,	B	August 1948.
,, sp.	E	July 1947.
	J	April 1948.
	A	August 1948.
Euastrum dubium Näg.	A	June 1947.
,, *inerme* (Ralfs) Lund.	A	January 1948.
,, sp.	A	May and August 1948.
	J	July 1948.
HETEROKONTAE.		
Botryococcus Braunii Kütz.	H	May 1947.
Tribonema bombycinum (Ag.) Derb. et Sol.	J	November 1947.
Bumilleria exilis Klebs.	H	May 1947.

DINOPHYCEAE.

Peridinium cinctum Ehrenb.	F	April-June 1947.
,, ,,	A, B	May 1948.
Glenodinium pulviscus (Ehrenb.) Stein	A	February 1948.
,, sp.	A	January 1948.
,,	J	April 1948.
,, *aeruginosum* Stein?	L	May 1947.

EUGLENINEAE.

Euglena acus Ehrenb.	J	April 1948.
Lepocinclis ovum (Ehrenb.) Lemm.	J	April 1948.
Phacus pleuronectes (O.F.M.) Duj.	J	April 1948.
,, ,,	G	May and August 1947.

The above three species, imparting a striking green colour to the water, were dominant in a small patch containing decaying organic matter.

Trachelomonas hispida (Perty) Stein	B	May 1948.

MYXOPHYCEAE.

Anabaena sp.	A	May 1947.
,,	A	July-August 1948.
Aphanothece microscopica Naeg.	L	November 1948.
Aphanocapsa sp.	H	May 1947.
Cylindrospermum stagnale Born. & Flah.	A	June 1947.
,, ,,	A	May and August 1948.
Phormidium sp.	A	May 1947.
Microchaete tenera Thur.	J	July-August 1948.

The Coleoptera of Bookham Common.

PALPICORNIA, LAMELLICORNIA.

By Alan M. Easton, M.B., B.S., F.R.E.S.

The beetles of the Sub-order Palpicornia, though in the larval stage in many instances carnivorous, feed during their adult life without exception on decaying vegetable matter. They comprise the family Hydrophilidae, and most, as their name implies, favour ponds and ditches, or are to be taken amongst the roots of waterside plants. Many species, however, prominent amongst which are some of the genus *Cercyon* Leach, resort for their provender to the dung of herbivorous animals, whilst a few, the very common *Anacaena globulus* Paykull for example, occur commonly in both situations. These latter, as well as others of the dung feeders, are frequently encountered in damp rotten fungi.

Having regard to the association of so many of the species with water and damp situations it is a little surprising to find that their representation on the Bookham Common does not quite reach 50% of the total species occurring throughout the country.

Of the Lamellicornia, the British species comprise the two families Scarabaeidae and Lucanidae. The latter is represented in these Islands by three species, all passing their larval existence in the damp rotten wood on which they feed, and all, as might be expected, to be encountered on the Common. The Scarabaeidae, on the other hand, are for the most part dung-feeders, though a few, like the cockchafer, frequent flowers, and trees, around which they fly at dusk. One, *Oxyomus sylvestris* Scopoli, confines its attentions to moist vegetable refuse, in which

it is occasionally joined by stragglers of the dung-loving species. Not for many years have domestic animals grazed in any numbers on the Common, so that for practical purposes the only stercoraceous matters are the pellets of rabbits, and the droppings of horses on the various rides. A solitary cow, recently joined by a companion, grazes from time to time on the grass bordering Little Bookham Street and plays its noble part in sustaining the coleopterous population. Under such circumstances the recording from the Common of thirty-one species, a little more than a third of the total for the British Isles, is highly gratifying.

In the following lists the nomenclature used is that adopted by Kloet and Hincks in their *Check List of British Insects*, 1945. Roman figures indicate months of capture, and in the case of a few local or rare species bracketed numerals correspond to the grid references of the Survey Base Map. The details given refer solely to the personal experience of the writer, except in the case of those species which he has failed to encounter, marked with an asterisk or double asterisk. The former (*) are quoted by kind permission from the records of Mr F. J. Coulson, author of the " Coleoptera of Bookham Common " (*Proc. S. Lond. Ent. and Nat. Hist. Soc.*, 1941-42), and the latter (**) are derived from various sources by personal communication.

Grateful acknowledgment is again expressed to all who have so kindly helped with notes, records, or determinations.

HYDROPHILIDAE.

Ochthebius bicolon Germar. IV, VII, VIII. In flood refuse below the Isle of Wight Pond, by sweeping along Bank's Stream, and in a moorhen's nest on Kelsey's Pond; not common.

O. minimus Fabricius. I, II, IV, V, VI, VII, VIII, X. Very common in *Equisetum* refuse below the Isle of Wight Pond, amongst roots beside the ponds, and in moorhens' nests, etc.

Hydraena testacea Curtis. III, VIII. In moorhen's nest from Kelsey's Pond, and at the edge of a large puddle; taken singly.

H. riparia Kugelann. IV. Two examples taken in flood refuse below the Isle of Wight Pond.

Limnebius truncatellus Thunberg. On November 10, 1940, I took a single example beneath a floating log a few yards beyond Hundred Pound Bridge, and not therefore strictly on the Common.

Helophorus aquaticus Linnaeus. II, III, IV, V, X. By sweeping along the streams, in puddles and flooded bomb-craters; frequent. The variety, *aequalis* Thomson, occurs sparingly.

H. brevipalpis Bedel. II, III, IV, V, VII, VIII, X. By sweeping along the streams, in *Equisetum* refuse, and in moorhens' nests, etc.; common.

H. minutus Fabricius. II, V, VI, VII, VIII, X. In similar situations to the last, and almost equally common

**H. granularis* Linnaeus. Mr F. J. Coulson has a series determined as belonging to a variety of this species.

H. flavipes Fabricius. I, II, III, IV, V, VIII. In the same situations as *H. minutus*, though in smaller numbers. Once taken in damp saw-dust.

***H. laticollis* Thomson. Mr F. D. Buck took this species April 21, 1940. (Determined by Mr J. Balfour-Browne.)

H. nanus Sturm. I, II. Twice found singly in *Equisetum* refuse below the Isle of Wight Pond.

Hydrochus elongatus Schaller. I, II, IV, V, VI, VIII, IX. By sweeping along the streams, in *Equisetum* refuse, amongst pond-side roots, and in moorhens' nests; never numerous.

Coelostoma orbiculare Fabricius. IV, VIII, IX. In *Equisetum* refuse, moorhens' nests, and on mud beside the Isle of Wight and Kelsey's Ponds.

Sphaeridium bipustulatum Fabricius. V, IX. In horse-dung, apparently preferring that deposited on grass.

**S. scarabaeoides* Linnaeus. Mr F. D. Buck took this species in October 1938, and Mr F. J. Coulson records it singly from a dead bird in April 1939, and cow-dung in June 1941.

S. lunatum Fabricius. III, IV, V, VII. In rotting oak-wood, moss, and by flood-sweeping. Once in horse-dung.

Cercyon ustulatus Preyssler. II, III, IV, V, VII, VIII, IX, X. By sweeping along Bookham Stream, by flood-sweeping, in moorhens' nests, at roots of water plants, etc.; not uncommon.

**C. lugubris* Olivier. Mr F. J. Coulson took this species singly in cow-dung on May 20, 1941, and again on June 8, 1942.

C. atomarius Fabricius. IV, V, VII, VIII, IX, X. Common in horse-dung, and cow-dung. Also in hay-refuse.

C. haemorrhoidalis Fabricius. II, IV, V, VII, VIII, IX, X. Common in horse-dung and cow-dung. Also in a moorhen's nest.

C. melanocephalus Linnaeus. IV, V, VII, VIII, IX, X. In horse and cow-dung; common.

C. marinus Thomson. V. Very common amongst roots on the muddy bed of Lower East Pond when almost dried up.

C. lateralis Marsham. IV, V, VII, VIII, IX, X. Very common in horse and cow-dung; also in rotting fungi, hay-refuse, and in a putrid fox.

C. terminatus Marsham. IV. Two examples in straw-refuse.

C. pygmaeus Illiger. IV, V, VII, VIII, IX, X. Very common in horse-dung, less so in cow-dung.

C. quisquilius Linnaeus. V, X. Numerous in cow-dung, one example in horse-dung.

C. convexiusculus Stephens. I, II, IV, V. In *Equisetum* refuse, amongst roots of water-plants, and in a moorhen's nest.

C. subsulcatus Rey. IV, V, VI, VII, VIII, IX, X. In *Equisetum* refuse, amongst pond-side roots, in moorhens' nests, etc. Apparently commoner than the last species, but their distinction is not easy.

C. analis Paykull. III, X. In some numbers in grass- and hay-refuse.

Megasternum obscurum Marsham. II, III, IV, V, VII, VIII, IX, X, XII. Very common in horse-dung and grass-refuse, and by flood-sweeping. Also in rotting *Polyporus squamosus*, one in a *Lycoperdon*, and two in a dead toad.

Cryptopleurum minutum Fabricius. III, V, VII, VIII, IX, X. Very common in horse-dung and hay-refuse.

C. crenatum Panzer. V, VII. In horse-dung; much less frequent than its congener.

Hydrobius fuscipes Linnaeus. II, III, IV, V, VI, VIII. By sweeping along the streams, in *Equisetum* refuse, amongst pond-side roots, and numerous in a moorhen's nest.

Anacaena globulus Paykull. I, II, III, IV, V, VI, VII, VIII, IX, X, XII. Common by sweeping along the ditches, and in *Equisetum* refuse, but also showing a marked liking for horse-dung, and rotting fungi (*Polyporus squamosus*).

A. limbata Fabricius. I, II, III, IV, V, VI, VII, VIII, X. By sweeping along the ditches, and in *Equisetum* refuse, and moorhens' nests; very common. The variety *nitida* Heer is quite frequent.

**Laccobius biguttatus* Gerhardt. Mr F. J. Coulson has a good series of this species taken on May, 23, 1930.

L. striatulus Fabricius. V. One example by sweeping along the streams, May 14, 1944.

**L. sinuatus* Motschulsky. Included in the list of the late Mr S. R. Ashby.

L. alutaceus Thomson. X. One example (♀) taken at roots of *Alisma plantago-aquatica* Linnaeus, Manor Pond, October 7, 1945.

Helochares lividus Forster. I, II, III, IV, V, VIII, IX, XI. In *Equisetum* refuse, and by sweeping along the ditches; also on muddy pond-sides; not numerous.

Enochrus melanocephalus Fabricius. V. One example in *Equisetum* refuse from the Isle of Wight Pond.

E. testaceus Fabricius. I, III, IV, V, X. In *Equisetum* refuse, and by sweeping along the ditches; sometimes quite numerous.

E. coarctatus Gredl. III, IV, V, VII, IX. In company with the last species, but commoner.

E. ochropterus Marsham. V, VIII. In *Equisetum* refuse, and in a moorhen's nest on Sheepbell Pond, August 11, 1940. A pupa taken on this occasion hatched the following day. Not common.

Cymbiodyta marginella Fabricius. I, II, III, IV, V, VI, VIII, IX, X. Very common, by sweeping along the ditches, in *Equisetum* refuse, moorhens' nests, etc.

**Chaetarthria seminulum* Herbst. Mr F. J. Coulson possesses a specimen from the collection of the late Mr S. R. Ashby, labelled September 1917.

Berosus signaticollis Charpentier. IV. Two examples by sweeping in the ditch below the Isle of Wight Pond, April 23, 1944, in company with the following.

B. affinis Brullé. I, II, III, IV. In *Equisetum* refuse, and by sweeping along the ditch below the Isle of Wight Pond; not common.

SCARABAEIDAE.

Onthophagus ovatus Linnaeus. IV, V. One example beneath rabbit-dung, and several in horse-dung.

O. fracticornis Preyssler. IV, V, VI, VII, VIII, IX, X. Commonly found in its burrows, one to two inches below rabbit-dung; also very numerous at times in horse-dung, and sometimes feeding on human faeces.

O. coenobita Herbst. V, VI. Quite common burrowing in the ground beneath horse-dung in 1940 and 1941, though not a single specimen was encountered in spite of ample search during 1948.

O. nuchicornis Linnaeus. Mr F. D. Buck records a female taken on April 21, 1940.

Typhaeus typhoeus Linnaeus. IV, X. On October 3, 1948, two fresh burrows were noted beneath some rabbit droppings; commencing about four inches apart they were sunk vertically for a similar distance, and then turned horizontally so that their occupants, a male and female, were on the point of meeting when disturbed. Also burrowing beneath dog-dung.

Aphodius erraticus Linnaeus. V, VII. In horse-dung; not common.

A. fossor Linnaeus. V. One example in horse-dung, May 18, 1941.

**A. haemorrhoidalis* Linnaeus. Taken by Mr F. J. Coulson in cow-dung, in May 1941 and 1942.

A. rufipes Linnaeus. IX, X. In horse-dung; not common.

A. zenkeri Germar. VIII, IX. This species was abundant in a patch of horse-dung (373) on August 25, 1940, but the following week only one example could be discovered

A. equestris Panzer. III, IV, V, VII, VIII, IX, X. Very numerous in horse-dung.

A. conspurcatus Linnaeus. II. In horse-dung; one example (286).

A. obliteratus Panzer. II, IX. In horse-dung in February, and one example in a rotting *Polyporus squamosus* in September; uncommon.

A. contaminatus Herbst. IX, X. In horse-dung in small numbers.

A. prodromus Brahm. II, III, IV, V, X. Extremely numerous in horse- and cow-dung, and at rabbit droppings; also attacking human faeces.

A. sphacelatus Panzer. II, III, IV, V, IX, X. Equally abundant, and in the same situations as the last.

A. merdarius Fabricius. V, VII. In horse-dung; not common.

A. pusillus Herbst. IV, V. In horse-dung; not uncommon.

A. fimetarius Linnaeus. III, IV, V, VII, VIII, IX, X. In horse- and cow-dung, and in hay-refuse. This species appears often to favour stale dry dung, in which respect it differs from other members of its genus.

**A. aestivalis* Stephens. Mr F. J. Coulson reports a female from the collection of the late Mr S. R. Ashby labelled Fetcham, September 12, 1897.

A. scybalarius Fabricius. X. One example in cow-dung, October 24, 1948.

A. ater Degeer. V. Several specimens in horse-dung, May 18, 1941.

A. tenellus Say. IV, V, VIII, X. In horse-dung, at times numerous.

A. granarius Linnaeus. V. A few examples in horse-dung, May 18, 1941.

Oxyomus sylvestris Scopoli. IV. One example in straw-refuse. This species appears to be surprisingly rare on the Common.

Trox scaber Linnaeus. VIII. One example in the remains of a tit's nest in a hole in an oak-tree, August 25, 1940.

Melolontha melolontha Linnaeus. V, VI. By beating oak, and hawthorn, and taken on the wing. Probably much commoner than it appears.

Phyllopertha horticola Linnaeus. VI. By beating birch.

LUCANIDAE.

Lucanus cervus Linnaeus. V. A female crawling on the grass beside the dead oak in Broadway (655).

Dorcus parallelopipedus Linnaeus. IX. One example in poplar cossus wood, which had fallen onto the Common (769).

Sinodendron cylindricum Linnaeus. III, VI. A male was found struggling in a cobweb in a hole in an aged pear-tree in the Isle of Wight enclosure, June 10, 1936. Several examples in a damp rotting log.

The Epping Forest Survey.

SEVENTH YEAR.

The Climate, 1948.

By H. Hawkins.

(Observed at 119 Beresford Road, Chingford.)

GENERAL REMARKS.

THE winter months were generally mild, and January had twice its usual rainfall. Spring and early summer were fine and sunny, with a record temperature of 72° on March 9th.

In the first half of July was the longest period since 1888 at low temperatures, but on the 28th the record maximum for the month of 93° was reached.

August was dull and wet, and the autumn was mild with rainfall slightly below average. Heavy frost occurred at the end of October, and there was an exceptionally persistent fog at the end of November. The year ended with gales and heavy rain.

A summary of the year's figures is given in the table. (For explanation see *Lond. Nat.*, No. 24, 1945, p. 36.)

Month.	Barometer.			Temperature. Screen.							Grass.			Rain.			Thunder. Gales.	Storms.	Fog.
	Max.	Min.	Avge.	Max.	Min.	Avge. Max.	Avge. Min.	Avge.	Avge. Daily Range.	Max. Range.	Max.	Min.	Avge.	Amt. in Inches.	No. of Rain Days.	No. of Wet Days.			No. of Days.
Jan.	30.00	28.90	29.56	56	27	47.48	38.13	42.80	9.35	29	51	23	34.74	4.05	22	18	10	—	—
Feb.	30.65	29.80	30.22	56	21	45.69	35.18	40.43	10.51	35	48	19	31.41	1.43	13	11	5	1	—
Mar.	30.70	29.10	30.35	72	31	55.71	38.77	47.24	16.94	41	45	26	34.48	0.62	6	4	3	—	5
Apr.	30.65	29.20	29.89	72	32	59.40	40.70	50.05	18.70	40	51	26	36.16	1.52	15	12	4	3	—
May.	30.40	29.50	29.95	78	32	64.68	44.10	54.39	10.58	46	52	28	40.71	1.97	11	9	—	3	—
June.	30.20	29.45	29.90	81	44	67.60	51.13	59.39	16.47	37	55	37	46.23	2.13	17	13	1	3	—
July.	30.30	29.55	29.93	93	43	71.61	53.90	62.75	17.71	50	63	39	50.87	0.78	8	4	—	1	—
Aug.	30.25	29.05	29.81	81	44	69.29	53.19	61.24	16.10	37	63	42	50.61	3.07	14	12	1	—	—
Sept.	30.40	29.30	29.93	78	33	67.76	50.33	59.04	17.43	45	62	30	47.10	1.51	11	6	—	—	—
Oct.	30.40	29.20	30.00	77	25	58.61	43.09	50.85	15.52	52	54	21	39.48	1.66	10	7	—	2	3
Nov.	30.55	29.40	30.16	61	28	50.43	39.63	45.03	10.80	33	52	23	36.90	2.16	15	8	—	—	10
Dec.	30.65	28.95	30.03	59	23	48.51	38.22	43.36	10.19	36	50	18	36.00	2.33	16	11	6	—	3
Year.	30.7	28.9	29.98	93	21	58.9	43.83	51.21	14.17	72	63	18		23.23	158	115	30	13	21

A Study of the Early Stages of Regeneration of Woodland in Epping Forest.

By D. J. Boatman, B.Sc.

INTRODUCTION.

During the period 1940-1945 a number of high explosives were dropped in Epping Forest, with the result that the trees close to the site of the explosion suffered very severely from blast, either being killed and even uprooted, or merely retaining a few live branches on the side remote from the crater. Thus the tree canopy over the affected areas was almost completely removed and the resultant destruction of the pre-existing ecological equilibrium enabled plants to establish themselves, which previously were incapable of existing because of the dense shade. By 1946 there was a series of affected areas ranging in age from 2 to 6 years and it was realised that it should be possible to determine from these the early successive stages in the return to the equilibrium state of forest. Accordingly in September, 1947, nine areas were selected for study, others being rejected on the grounds of insufficient size or surroundings unsuitable for comparison.

Observations were made during September and early October of 1947 and in March 1948, and it is hoped to make further studies at a later date. Depending on the type of area under observation one or more of the following methods of recording results were used:—

1. Maps were drawn, approximately to scale, to give an overall idea of the layout of the area where this was divided into distinct communities.
2. Line transects were made to show the effect of different factors on the composition of the vegetation. The transects were selected at random and the positions of all plants touching a stretched tape were plotted.
3. Quadrats 3′ x 3′ were used to give information on the distribution of species in herbal communities.

A list of the species present in each area was also compiled, though no attempt was made to sub-divide *Rubus fruticosus* agg. It was also found impossible to separate adequately the two species of Birch in the seedling stage; intermediate forms were numerous and therefore both *Betula alba* L. s. str. and *B. pubescens* Ehbr. are included under the former name.

In the following account, each area is described in turn, map references being given from the National Grid (O.S. Sheet 160), plant identifications referring to the seventh edition of Bentham & Hooker's *Handbook of the British Flora* (reprinted 1947) and Dixon's *The Student's Handbook of British Mosses.*

DESCRIPTION OF THE AREAS.

Area 1 (see fig. 1).

Position: N. of Hill Wood, near High Beach. Grid Ref.: 406972. Date of formation: 1944 (rocket).

This was an area of some 500 sq. yds. situated on sloping ground in mixed woodland of Beech, Hornbeam and Birch, Beech being dominant. The blast appeared to have been one-sided, thus presenting an uninterrupted area of ground for colonisation. The underlying rock was London Clay but the vegetation, which did not exceed a height of 2′ 6″, was divided quite distinctly into two communities; one comparatively open with the Common Rush (*Juncus effusus*) as the predominant plant, and the other dominated by Bramble (*Rubus fruticosus*). The frequency of the species in these two zones is shown in Table I.

On fig. 1 the positions of all Birch saplings above 2′ in height are marked, and it may be seen that though there are several in and very near the Bramble Zone, none is present in the Rush Zone, except at the very edge, bordering the Bramble Zone. An examination of the Birches of the Rush Zone showed that all the older ones had been eaten off at the top. Hence it may be concluded that the Bramble was acting as a "nurse," protecting the Birches from grazing animals.

The most abundant mosses in the area were *Dicranella heteromalla* and *Webera nutans*. The former was exclusive to the Rush Zone and the protonema formed a continuous compact surface to the soil, while the latter was limited to the broken soil surface of the Bramble Zone.

TABLE I.

The frequency of species in the "Rush" and "Bramble" Zones of Area I.

Species.	Rush Zone. % of quadrats in which species occurred.	Rush Zone. Average number of plants per quadrat.	Bramble Zone. % of quadrats in which species occurred.	Bramble Zone. Average number of plants per quadrat.
Betula alba	75	2.4	85	3.5
Carpinus betula	25	—	15	—
Fagus sylvatica	5	—	—	—
Agrostis tenuis	80	1.4	40	.5
Aira caespitosa	—	—	20	—
Carex sp.	45	.7	20	.25
Epilobium angustifolium	—	—	30	—
Holcus lanatus	30	—	45	—
Juncus effusus	90	3.5	40	.5
Lolium perenne	5	—	—	—
Polygonum hydropiper	10	—	—	—
Potentilla erecta	5	—	—	—
Rumex acetosella	10	—	30	—
Pteris aquilinum	5	—	—	—
Rubus fruticosus	35	—	100	—

Total number of quadrats for each zone: 20.

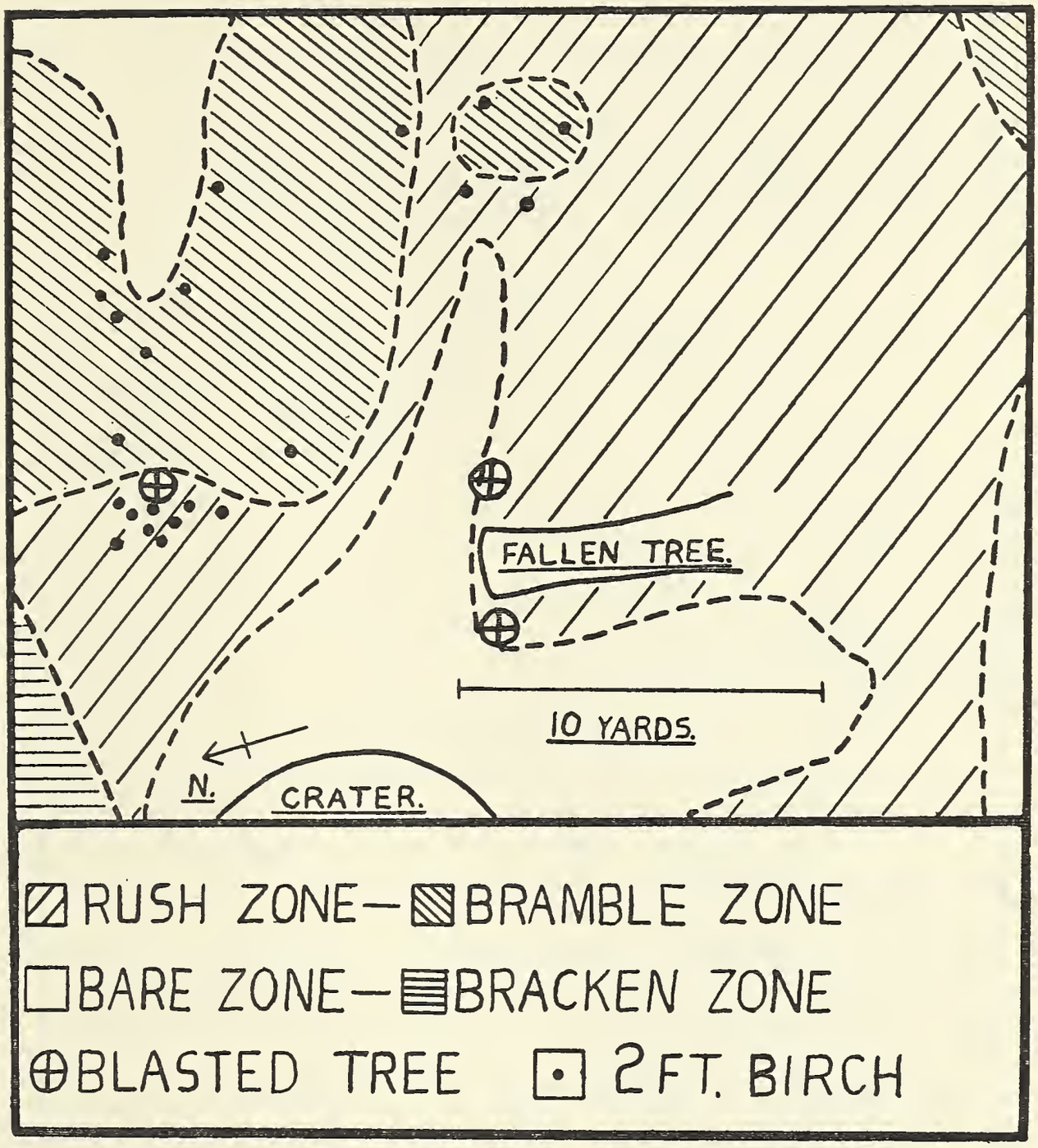


Fig. 1—Showing the distribution of communities in Area 1.

Area 2.

Position: S.E. from Loughton Camp. Grid Ref.: 422973.

Date of formation: July 1944 (rocket).

As no crater was present, it was concluded that this Area was formed by an aerial explosion. The trees, though left standing, were severely damaged, and when examined 3 years later were almost devoid of foliage. The Area was situated in Beech Wood on London Clay, and the vegetation resembled that of Area 1 in its low stature and in the prominence of tree seedlings and herbs. Considerable differences, however, were shown in the frequency of species common to both Areas, as may be seen by comparing Tables I and II. Birch seedlings and *Epilobium angustifolium* were the most common plants and a dense strip of Foxglove (*Digitalis purpurea*) crossed the Area. Many of the Birches

were over 2′ in height, and, as shown by the number of lateral branches, at least 2 years old. Hornbeam seedlings, though not common, were quite widespread. The Bramble was almost completely absent and the Common Rush was limited to the shaded S.E. side, where the ground was covered by *Dicranella* protonema. Rather significantly the moss flora of the rest of the Area consisted largely of *Webera nutans*, and the soil surface resembled that of the Bramble Zone of Area 1.

TABLE II.

Frequency of Species in Area 2.

Species.	% of quadrats in which species occurred.	Average number of plants per quadrat.
Betula alba	96	16
Carpinus betula	40	—
Aira flexuosa	12	—
Calluna vulgaris	4	—
Carex sp.	20	—
Digitalis purpurea	32	—
Epilobium angustifolium	76	—
Juncus effusus	16	—
Molinea caerulea	4	—

Total number of quadrats : 25.

Area 3 (see fig. 2).

Position: Just S. of Manor Road, Buckhurst Hill. Grid Ref.: 411950. Date of formation: October 1940 (land mine).

This Area, surrounded by Oak, Hornbeam and Birch was extensively overgrown by Brambles which, in many cases, formed bushes over 3′ in height. Birch saplings, up to 8′ in height, were liberally distributed over the Area, though neither sufficiently close together nor well enough developed to form a continuous canopy. The Common Rush was widespread and the Soft Holcus (*Holcus mollis*) was abundant beneath Brambles up to 1′ in height, where isolated patches of Sheep's Sorrel (*Rumex acetosella*) were also to be found. Very few plants were growing in association with the well developed Bramble bushes, however, though in one spot a dense tangle, about 2′ in height, of Bramble and Common Rush had been formed. Hornbeam and even Oak seedlings, which were plentiful beneath the low Brambles, were absent where this formed bushes more than 1½′ in height (see fig. 2). Occasional seedlings and saplings of Mountain Ash (*Pyrus aucuparia*) and Sycamore (*Acer pseudoplatanus*) were also present. The Yorkshire Fog (*Holcus lanatus*), though abundant in the neighbouring Area 7, was, except for one large patch, restricted to the edge of the central crater in this Area. The Rose-bay Willow Herb (*Epilobium angustifolium*) and the Bluebell (*Scilla nonscripta*) were also locally present.

The whole Area was dissected by pathways colonised largely by *Agrostis tenuis*. This species, however, had not spread into the bordering Brambles.

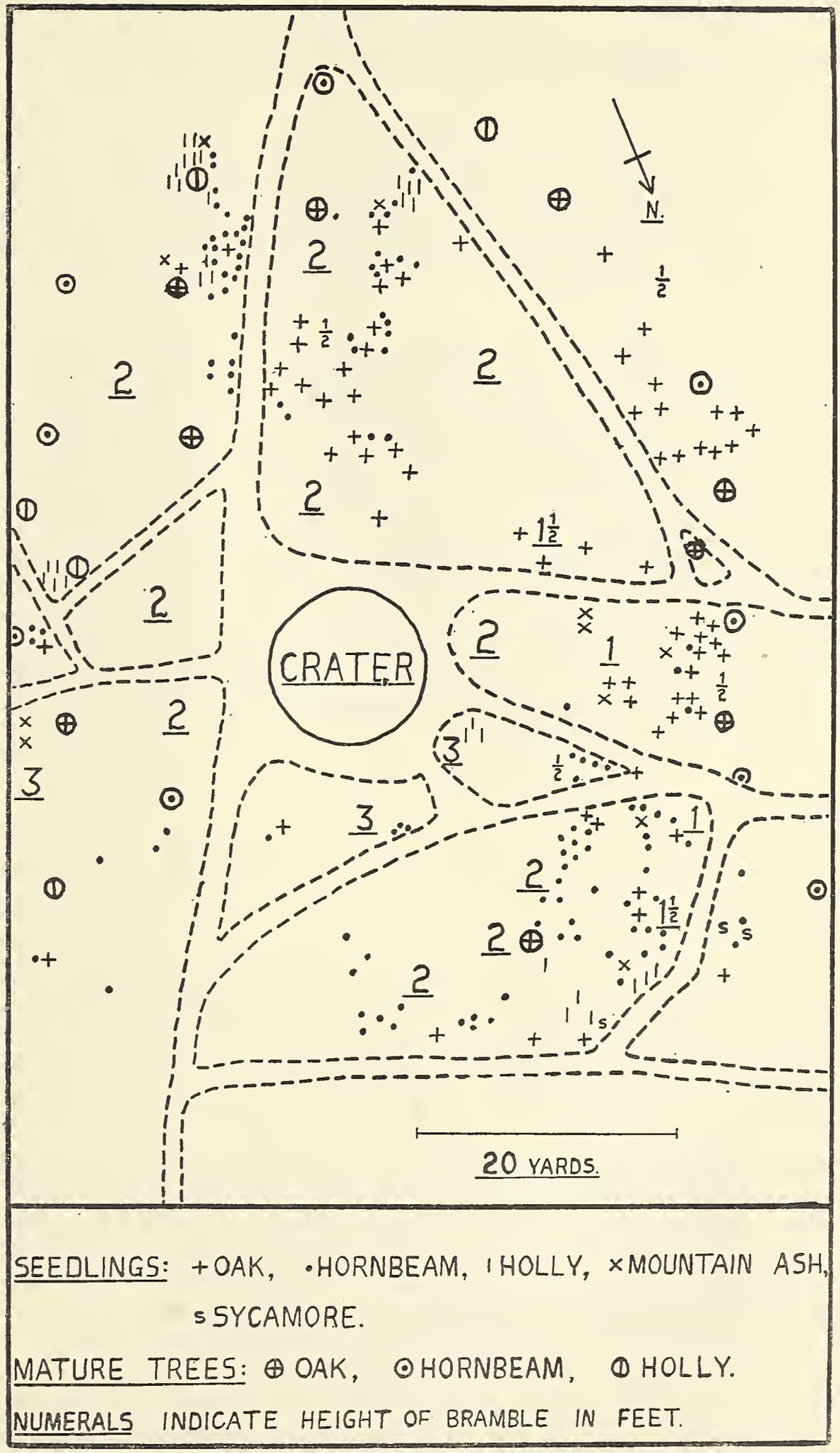


Fig. 2—Distribution of tree seedlings (excluding birch) in Area 3.

Area 4 (see fig. 3).

Position: Between Paul's Nursery and the Epping New Road. Grid Ref.: 414980.

Date of formation: 1940 (bomb).

This was a small area of about 300 sq. yds. caused by the dropping of a bomb at the source of a small streamlet. The ground surrounding the crater, which was always full of water to overflowing, was sufficiently wet to allow a much elongated form of *Pellia epiphylla* to grow, and the Bog Moss (*Sphagnum*) was abundant in the shallow water at the edge.

The Area, which was on sloping ground over London Clay, was divided into two zones. One, below the crater, was a dense tangle of Bramble and Common Rush, while the other, above the crater, was dominated by Birch saplings up to 10′ in height. The Bramble Zone probably existed before the bomb fell as there was no evidence of pre-existing trees. The Birches of the Birch Zone grew to within about 10′ of the crater's edge and from here to about 20′ from the crater, a dense thicket of Birches, Bramble and Bracken, with frequent tufts of Purple Moor Grass (*Molinea caerulea*) and Common Rush had been formed (fig. 3). Within this ring, forming a narrow strip round the crater, was a community, kept low by treading, composed largely of Moor Grass, the Rushes *Juncus effusus* and *Juncus articulatus* (agg.) and a species of Bent (*Agrostis stolonifera*) while outside it were 10-12′ Birches, accompanied by Bramble only.

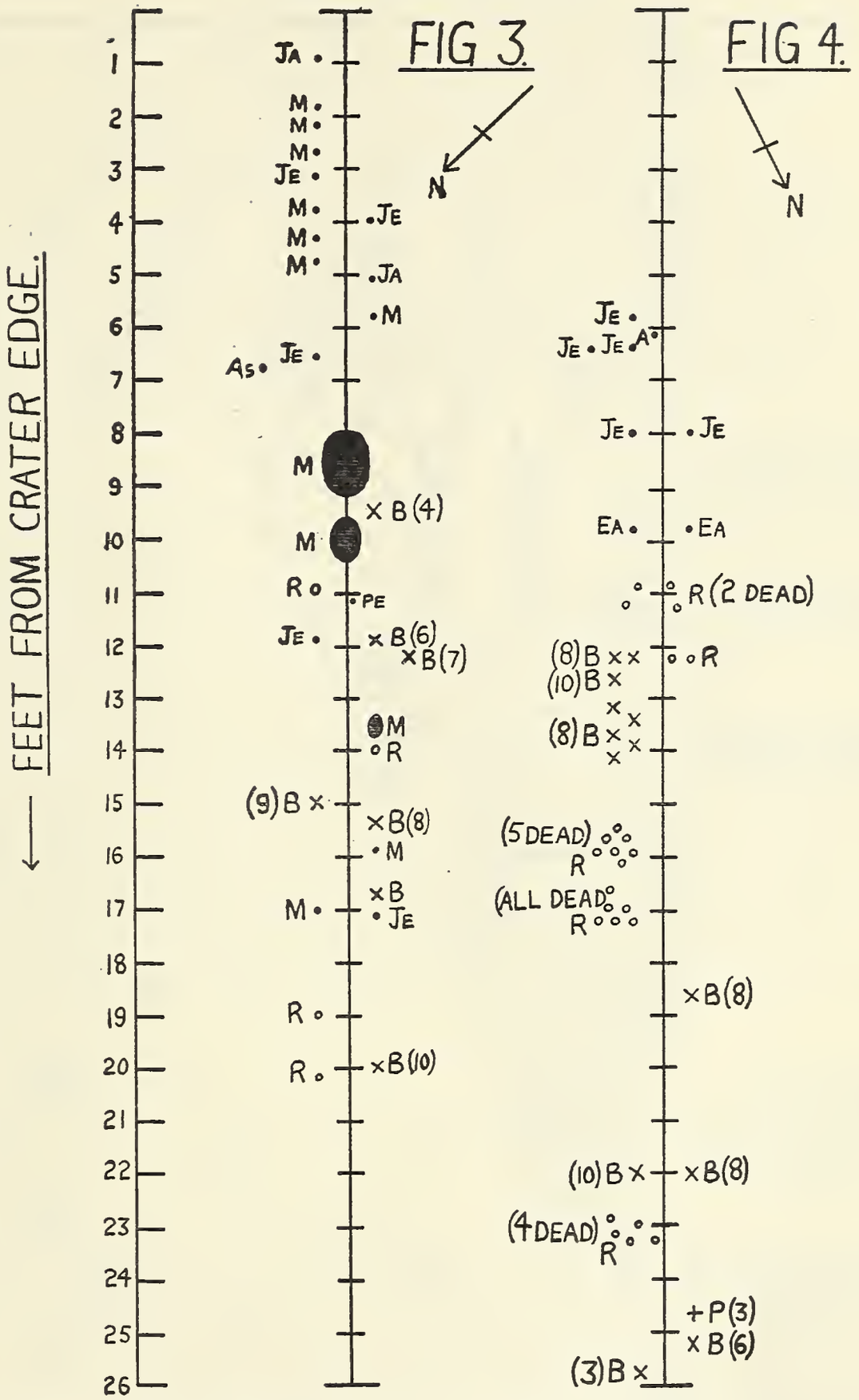
Area 5.

Position: In the fork between High Beach Road and Woodridden Hill. Grid Ref.: 424993.

Date of formation: 1940.

About 600 sq. yds. in area, this site was situated on London Clay and surrounded by Beech-Birch Forest. To the South-West was a grassland dominated by *Molinea caerulea*, in which the heaths *Erica tetralix* and *Calluna vulgaris* were also abundant. The area was dominated by 10 foot Birch saplings and *Rubus fruticosus* was almost completely absent. The latter species was also rare in the surrounding forest. Purple Moor Grass was abundant along the pathways, occasionally in association with Yorkshire Fog, and in patches not occupied by Birch. The common Rush was also abundant, especially around the crater, but, like the Moor Grass, it was absent in the Birch thickets or represented by very poor specimens. The comparative abundance of the Purple Moor Grass, the Heaths and the Wavy Hair Grass (*Aira flexuosa*) was no doubt due to the abundance of these plants on the neighbouring plain.

Bracken was very local in distribution and a single patch of Rosebay Willow Herb was present. Hornbeams and Beeches were seen regenerating from seed beneath 7 foot Birches.



Figs. 3 and 4. Radial transects, in part, of Areas 4 and 6 respectively.

A.s. = *Agrostis stolonifera*.
B. = Birch (*Betula alba*). Numerals indicate height of sapling in feet.
E.a. = Rose-bay Willow Herb (*Epilobium angustifolium*).
J.e. = Common Rush (*Juncus effusus*).
J.a. = Jointed Rush (*Juncus articulatus*).
M. = Purple Moor Grass (*Molinea caerulea*).
P.e. = Tormentil (*Potentilla erecta*).
P. = Mountain Ash (*Pyrus aucuparia*).
R. = Bramble (*Rubus fruticosus*)
(Numerals in brackets show height of seedlings in feet.)

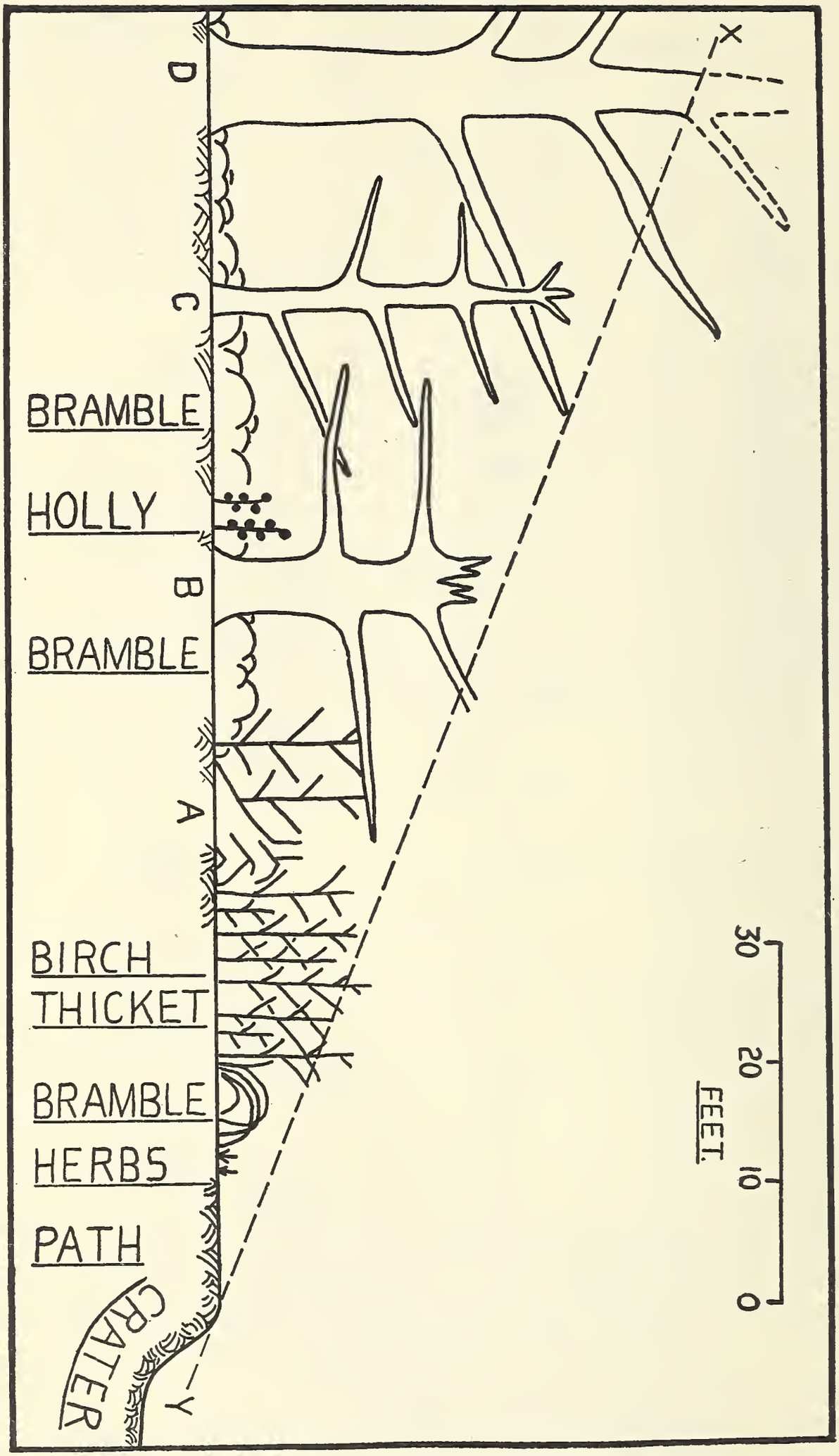


Fig. 5. Radial profile showing "inverted cone of blast." Area 6 (see text for description).

Area 6. (*See figs. 4 and 5.*)

Position: *Lord's Bushes, Buckhurst Hill. Grid Ref.*: *408936.*

Date of formation: *September 1940* (*Land Mine*).

This Area was situated on London Clay surrounded by woodland containing Oak, Beech, Hornbeam and Birch. The Birch saplings were from 4-12′ high and, growing in close proximity, formed a dense thicket with a completely closed canopy. In this Area, the abundance of dead stems of Bramble coincided with maximum development of the Birch canopy and gave a very clear picture of ecological succession; a point discussed more fully later on. Herbs such as the Common Rush and the Rose-bay Willow Herb were restricted to a narrow strip around the crater.

In the Birch thicket there appeared to be a definite level, at about 5-6′, above which all the branches were alive and sprouting, but all branches and saplings below this level were dead. Occasional saplings of the rapidly growing Mountain Ash were growing in association with the Birches, but an extensive search revealed only one seedling each of Oak and Hornbeam, both of which were growing alongside pathways.

Fig. 5 is a profile from the centre of the crater to the edge of the Area on which the positions of the remains of mature trees are marked. Tree A at a distance of 30 feet from the crater has been completely uprooted, while the Beech B and the Oak D, though still standing, have been killed at respectively greater heights, the former at 20 feet and the latter at 40 feet above ground level. It may be seen that the line XY joining the tops of D and B also passes through the edge of the crater. Thus it appears that in the explosion an inverted " cone of blast " was formed, the " surface " of the cone being marked by the line XY.

Area 7. (*See fig. 6.*)

Position: *Between Manor Road and Cricket Field, Buckhurst Hill. Grid Ref.*: *411949.*

Date of formation: *1944* (*Rocket*).

This site, situated on London Clay, and some 450 sq. yds. in area, was divided into the 4 zones A B C D shown in fig. 6. To the S.E. of the crater was a horse ride, and between this and the crater itself was a zone (Zone C) in which Yorkshire Fog, Thistles, and Coltsfoot (*Tussilago farfara*) had established themselves. The ground had obviously been covered by clay thrown up during the explosion. Zone A, to the S.W., was colonised predominantly by Bent (*Agrostis tenuis*) but a few Bramble seedlings were present and mounds of clay in the Zone were colonised by Yorkshire Fog. The largest Zone, Zone B to the N.W., was dominated by Bramble, which had formed a dense tangle about 2 feet in height beneath which was an abundance of dead Yorkshire Fog. Three or four Oak stumps were present in the Zone and around these, and along the paths that had been trodden through the Brambles, were several Oak

seedlings. Birch saplings and seedlings were completely absent from these three zones and both Common Rush and Rose-bay Willow Herb, though present, were uncommon.

Zone D, which had almost certainly been burnt some years previous to the explosion, was dominated by Gorse, and had not been modified by the blast.

The forest surrounding the Area contained Oak and Hornbeam, the nearest Birch, apart from a few sprouting stumps in Zone D, being at a distance of about 150 yards to the N.E. To the East of the horse-ride, the forest floor was covered with Bramble and Yorkshire Fog.

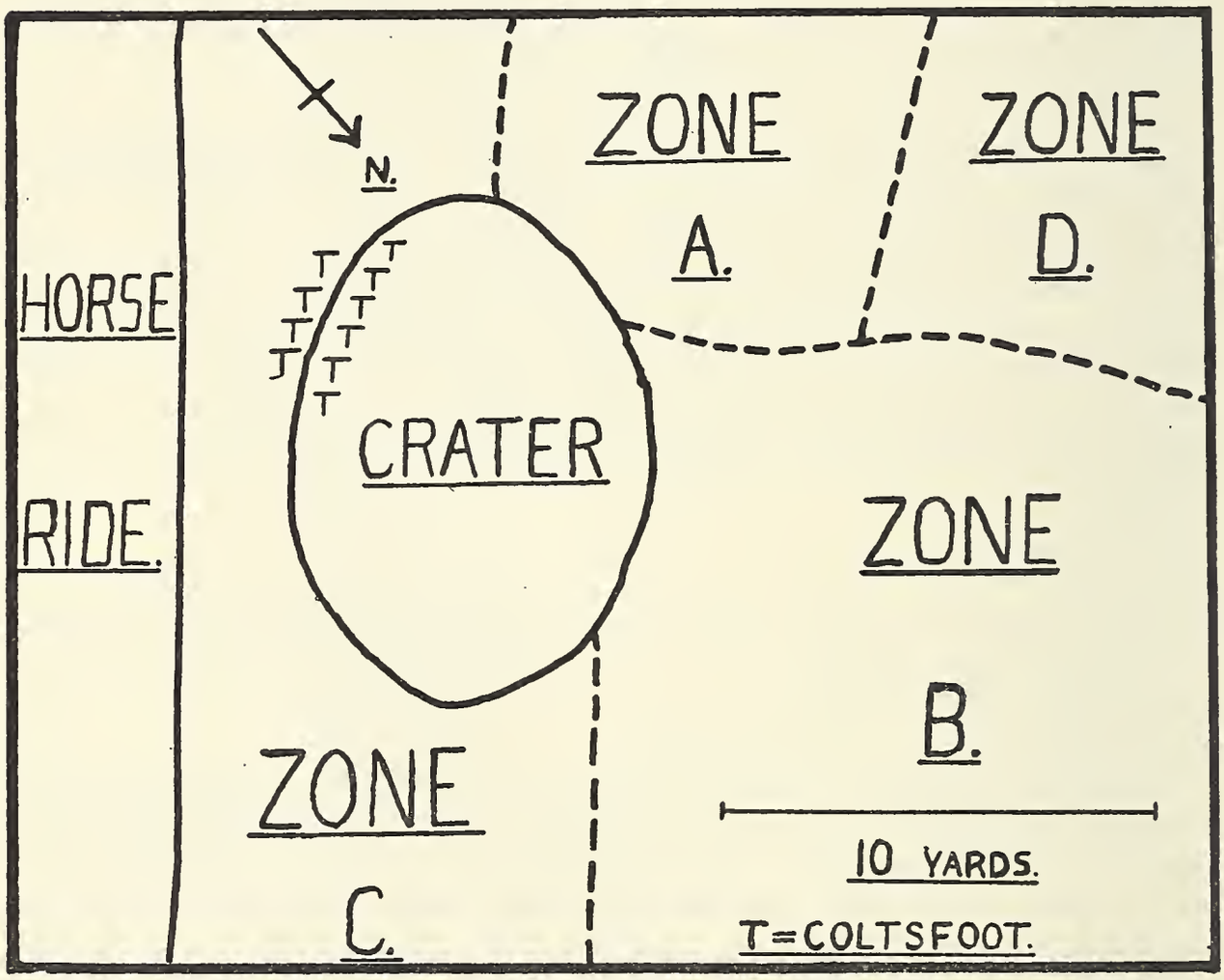


Fig. 6. To show the distribution of communities in Area 7.

Area 8.

Position: *Near High Beach Church. Grid. Ref.*: *409979.*
Date of formation: *1944* (*rocket*).

This Area, situated in a Birch-Bracken glade, supported a very different type of community from that occurring in any of the previously described Areas. It was also unique in being situated on Bagshot Sands. The whole surrounding area was extremely uneven, the site having been freely dug for gravel in the past.

The plant remaining as dominant in the Area was Bracken, which, in some cases, attained a height of five feet. Beneath this, occasional etiolated stems of Bramble, and small patches of Soft Holcus (*Holcus mollis*), were present, but the only plant at all widespread was the Wavy Hair Grass (*Aira flexuosa*). Several small clearings of area 5-10 sq. yds. were scattered over the site, and out of nine examined, the Soft Holcus was by far the most common plant in eight. The ninth was a depression, and here the Common Rush was dominant. Around the periphery of these areas, however, in the shade of the Bracken, the Holcus was replaced, Wavy Hair Grass, Common Rush or Birch seedlings being the colonisers. These Birch seedlings were very small and usually very numerous. It is interesting to note that similar areas beneath the Birches in the surrounding wood were usually colonised by Wavy Hair Grass.

The trampled pile of subsoil thrown up by the explosion around the edge of the crater, bore a very open community, the most common plant being the Common Rush. Yorkshire Fog, Tufted Aira (*Aira caespitosa*), Bramble, and Bent Grass (*Agrostis tenuis*) were also present.

Area 9.

Position: *Just S. of the Wake Valley Pond. Grid. Ref.*: *424993.*
Date of formation: *October 1940* (*mine*).

Though situated on London Clay, this Area showed considerable resemblance to Area 8. Like this Area, it was surrounded by Birch trees, with occasional Oaks and Hornbeams. Again the dominant plant in the Area was Bracken and the Wavy Hair Grass was the most abundant associate (see Table III). The Soft Holcus and also the Purple Moor Grass were occasional in occurrence beneath the Bracken, and though no Oak seedlings were found, occasional Hornbeams were to be seen. In spite of the considerable age of the Area, Birch saplings were very limited in number, and those present showed a distinct tendency to form groups. The Bramble was very rare in the Area. It was also very limited in the surrounding forest. One small, rather wet area near the crater was dominated by the Purple Moor Grass, and a considerable amount of Common Rush was also present. Coltsfoot was common about the crater edge and Rose-bay Willow Herb, though uncommon, was widely distributed.

TABLE III.

Frequency of species in Areas 8 and 9.

	% of quadrats in which species occurred in Area 8.	% of quadrats in which species occurred in Area 9.
Betula alba	—	16
Carpinus betula	—	32
Fagus sylvatica	10	—
Quercus robur	20	—
Agrostis tenuis	—	16
Aira flexuosa	70	96
Calluna vulgaris	—	8
Holcus mollis	25	24
Juncus effusus	5	—
Lonicera periclymenum	10	8
Molinea caerulea	—	32
Pteris aquilina	100	100
Rubus fruticosus	35	8
Tussilago farfara	—	8
Ulex europaeus	5	—

Number of quadrats in Area 8 : 20.
Number of quadrats in Area 9 : 13.

DISCUSSION.

Of the nine areas described above, the first six may be considered to represent successional stages in regeneration of the mixed forest type in Epping Forest. Three stages may be discerned : —

1. A primary invasion by herbs including grasses, and tree seedlings, especially Birch.
2. The development of a Birch-Bramble thicket and the elimination of the herbs.
3. The closing of the Birch canopy and the consequent suppression of the Bramble.

Area 7 appears to illustrate a modified succession induced by the failure of Birch to colonise, and Areas 8 and 9 exemplify the effect of a pre-existing difference in the dominating flora on the subsequent succession.

The first stage in the succession is represented by Areas 1 and 2. Examination of these two sites, however, shows that the only plant really abundant in both is Birch and it may well be concluded that this is the only characteristic pioneer. Examination of Areas 3, 4, 5 and 6, however, shows the constant occurrence of Common Rush, Bent, and Rose-bay Willow Herb, especially round the crater edge where the light intensity is at a maximum; and it should be noticed that though their distribution varies greatly in Areas 1 and 2, all are represented. These plants, therefore, may also be considered as " constant " pioneers. In contrast to these are such plants as Waterpepper (*Polygonum hydropiper*), Heather, and Wavy Hair Grass, whose presence is determined by the proximity of parent seed plants, which are only locally distributed in the forest. The Yorkshire Fog and Purple Moor Grass are

also well represented in the series and seedlings of both *Carex* and Hornbeam are common to both primary areas.

In Area 2, the vegetation consists mainly of a Birch-Herb community and in Area 1 this type appears to have been invaded subsequently by Bramble. In other cases, however, it is probable that Bramble was present from the beginning, its perennating root system having escaped damage by the blast. At this stage, however, the growth would have been very low due to the shading effect of the trees, and the population of the Bramble Zone of Area 1 and the low Bramble regions of Area 3 show that the influx of herbs would not have been prevented.

The increase in light intensity after the explosion, however, enables the Bramble to grow far more luxuriantly, and, together with the rapidly growing Birch, a dense Birch-Bramble tangle is formed within 4-5 years. The Birch rapidly outstrips the Bramble in vertical growth and by the 6th-7th year the only survivors of the earlier communities are to be found bordering the well-trodden paths surrounding the crater and, to a lesser extent, along those dissecting the Birch thicket.

It is interesting to note the comparative distribution of Angiosperms and Mosses in Areas 1 and 2. A considerable part of Area 1 was covered by *Dicranella* protonema and beneath this the humus was very compact and black. Where *Dicranella* was absent, however, the humus was light and brown in colour, and here the most common moss was *Webera nutans*. These two areas coincided with the " Rush " and " Bramble Zones " respectively and the difference in frequency of associated plants should be noted (Table 1). Rush and Bent have decreased noticeably in the Bramble Zone while Birch has increased and Rose-bay Willow Herb has entered. Comparison of Areas 1 and 2 shows that Area 2 is largely similar to the Bramble Zone of Area 1. Birch and Rose-bay Willow Herb are more frequent whereas Bent is absent and Rush is limited to a small zone carpeted with *Dicranella* protonema. In an attempt to explain this distribution, pH and moisture content determinations were made but no significant differences were found. The only differences recorded were in humus content, that of the Rush Zones being lower, so it is possible that this factor may directly or indirectly affect the distribution.

The methods of invasion by Bramble and Bracken are also well displayed in Area 1. Bramble, as well as its vegetative means of reproduction, may also be distributed by seed, and is therefore able to colonise the centre of the Area. Bracken, however, requires very moist conditions for sexual reproduction and, though prothalli and young sporophytes have frequently been seen in wet areas of the forest, its spread in these comparatively dry areas is limited to invasion from the periphery by vegetative propagation.

A further point of interest is the distribution of Foxglove in Area 2. The density of plants in the strip where it occurs is considerable (5.5 plants/sq. yd.) but in the other areas studied, the plant is non-existent. Tansley, in *The British Islands and their Vegetation*, 1939, p. 285, does mention that the Foxglove has a habit of suddenly appear-

ing in great numbers in cleared areas; but were its method of dispersal so efficient it would be expected to have colonized the whole Area. The species was not found in the surrounding forest. The most plausible explanation appears to involve the human factor.

Though Birch is by far the most abundant tree invader of these Areas, other trees colonize at a very early stage as indicated by their presence in Areas 1 and 2. Fig. 2 shows the distribution of all tree seedlings other than Birch in Area 3 and it is interesting to note that in spite of the apparent lack of any positive dispersal mechanism Oak has penetrated as far into the Area as the Hornbeam, which is well-fitted for wind dispersal. In this connection it is interesting to note the absence of Birch trees from Area 7, which is to the S. of Area 3. The only Birches near this Area are to the N. of Area 3 and map 3 shows that the trees tend to invade in a N. to N.E. direction. The absence of the seedlings from Areas 4, 5 and 6, however, suggests that, after this primary invasion, they are killed off by the shading of the Birch canopy so that presumably any trees that may eventually exist in the climax community must arise from a secondary invasion, when the Birch canopy has opened out. The validity of this suggestion is supported by the fact that even 3-foot Birch seedlings are killed off in these dense Birch thickets.

In spite of the abundance of seed parents, it appears, however, that Birch is unable readily to colonize Areas overrun by Bracken, as shown in Areas 8 and 9. The influential factor appears to be not the shading but the deep litter formed, for seedlings were found to flourish on the sides of the small clearings in Area 8, in the full shade of the Bracken. The grouping of Birch saplings in Area 9 appears significant in this connection. Table III, however, shows that Oak and Hornbeam seedlings are able to establish themselves in this litter.

Finally, it may be of interest to consider very briefly the possible practical applications of an investigation of this sort. In the *Journal of Forestry*, 1948, vol. XLII, p. 109, Wass advocates the use of natural regeneration as a means for afforestation. A preliminary investigation of the type outlined above might help to decide whether or not such an experiment would be likely to succeed.

In conclusion, I wish to express my thanks to Mr J. F. Shillito, B.Sc., for the interest he has shown throughout the course of this work; to Miss P. E. Stokes, B.Sc., for assistance in preparing the figures for publication; and finally to Professor W. H. Pearsall, F.R.S., for permission to publish the results of field-work undertaken as a student in the Botany Department, University College, London.

APPENDIX.

Alphabetical List of Species recorded showing Areas of Occurrence.

Area Numbers	1	2	3	4	5	6	7	8	9
Angiosperms and ferns species (B. & H., 1947)									
Acer pseudo-platanus L.	–	–	+	–	–	–	–	–	–
Agropyrum repens Beauv.	–	–	–	–	–	–	+	–	+
Agrostis tenuis (Sibth.)	+	+	+	+	+	+	+	+	+
Agrostis stolonifera L.	–	–	–	–	+	–	–	–	+
Aira caespitosa L.	+	–	–	–	+	–	+	+	–
Aira flexuosa L.	–	+	–	–	+	–	+	+	+
Avena pratensis L.	–	–	–	–	–	–	+	–	–
Betula alba agg.	+	+	+	+	+	+	–	+	+
Calluna vulgaris Salisb.	+	+	–	–	+	–	–	–	+
Carduus arvensis Robs.	–	–	–	–	–	–	+	–	+
Carduus lanceolatus L.	–	–	–	–	–	–	–	–	+
Carex sp.	+	+	–	+	+	–	–	–	–
Carpinus betulus L.	+	+	+	–	+	+	–	–	+
Dactylis glomerata L.	–	–	+	–	–	–	+	–	+
Digitalis purpurea (L.) Trin.	–	+	–	–	–	–	–	–	–
Epilobium angustifolium L.	+	+	+	–	+	+	+	+	+
Erica tetralix L.	–	–	–	–	+	–	–	–	–
Fagus sylvatica L.	+	–	–	–	–	–	–	+	–
Galium saxatile L.	+	+	–	–	–	–	–	–	–
Holcus lanatus L.	+	+	+	–	–	–	+	+	+
Horcus mollis L.	–	–	+	–	–	–	–	+	+
Ilex aquifolium L.	–	+	+	–	–	+	–	–	–
Juncus articulatus agg.	–	–	–	+	–	–	–	–	–
Juncus effusus L.	+	+	+	+	+	+	+	+	+
Lolium perenne L.	+	–	–	–	–	–	–	–	–
Lonicera periclymenum L.	–	–	–	–	–	–	–	+	+
Molinea caerulea Moench	–	+	–	+	+	+	–	+	+
Nardus stricta L.	–	–	–	–	–	–	–	+	–
Polygonum hydropiper L.	+	–	–	–	–	–	–	–	–
Potentilla erecta Hampe	–	–	–	+	–	–	–	–	+
Pteris aquilina L.	+	+	–	+	+	–	–	+	+
Pyrus aucuparia Gaertn.	–	–	+	–	–	+	+	+	+
Quercus robur L.	+	+	+	+	+	+	+	+	+
Rubus fruticosus agg.	–	–	–	–	–	–	+	–	+
Rosa canina agg.	+	–	+	–	–	–	–	+	–
Rumex acetosella L.	–	–	+	–	–	–	–	+	–
Scilla non-scripta Hoffm. & Link.	–	–	–	–	–	–	+	–	–
Solanum dulcamara L.	–	–	+	–	–	+	–	–	–
Taraxacum officinale Weber	–	–	–	–	–	–	–	–	+
Teucrium scorodonia L.	–	–	–	–	–	–	–	+	+
Tussilago farfara L.	–	–	–	–	–	–	+	–	+
Ulex europaeus L.	–	–	–	–	+	–	+	+	–
Mosses (not exhaustive) (Dixon):									
Ceratodon purpureus Brid.	–	–	+	–	–	–	+	–	–
Dicranella heteromalla Schp.	+	+	–	–	–	+	–	–	–
Funaria hygrometrica Sibth.	–	–	–	–	–	–	–	+	–
Hypnum cupressiforme L.	–	–	–	–	–	+	–	–	–
Hypnum riparium L.	–	–	–	–	–	–	+	–	–
Leucobryum glaucum Schp.	–	+	–	–	–	–	–	–	–
Polytrichum formosum Hedw.	+	+	–	–	–	+	–	–	–
Webera nutans Hedw.	+	+	–	–	–	+	–	–	–

The Dragonflies (Odonata) of the London Area

By Cynthia Longfield, F.R.E.S.

PART I.

THE London Area, for the purposes of this survey, is the area as defined by the London Natural History Society, within a 20-mile radius from St Paul's Cathedral. This circle is purely arbitrary, but not more so than any county boundary. The area contains the whole of the L.C.C. County of London (not recognised by the naturalists as a separate county), the whole of Middlesex, and parts of Hertfordshire (Herts), Essex, Kent, Surrey and Buckinghamshire (Bucks). Essex and Kent have been sub-divided into North Essex (E1), South Essex (E2), West Kent (and East Kent outside our area). Vice-county numbers have also recently been adopted by all branches of natural science, and in consequence I have combined together all these locality "labels," so that the distribution can be linked up with published ancient and modern records alike. I have worked clock-wise round our boundaries, starting with Middlesex, the true London county.

The area was chosen many years ago by the London Natural History Society, as a convenient distance in all directions from the centre for a day's excursion, but the collectors of the 19th Century extended the Metropolitan district even further, at anyrate south of the River Thames. In their day so little exact data was noted down that it is often difficult to decide whether the dragonflies were taken from within our present boundaries. One of the earliest and the most important collector of British dragonflies was James Francis Stephens, who largely obtained his specimens in the Metropolitan district and whose collection is in the British Museum (Natural History). Stephens placed no data under the specimens, but noted the localities of many of the species in the sixth volume on the "Mandibulata" (printed between 1835 and 1837) of his classical work entitled "Illustrations of British Entomology."

W. F. Evans lived at the same time as Stephens and used many of his specimens as models for the coloured drawings to illustrate his privately circulated little book on "British Libellulinae," in 1845. Evans also collected some dragonflies himself in or near London. James Charles Dale, who lived at Glanvilles Wootton, Dorset, during the same period and whose collection is now at Oxford (augmented by those of his son, C W. Dale and by the purchase of the collection of W. F. Evans), received from time to time, as gifts or by exchange, specimens taken in the London area, and these are all labelled with the locality. Earlier in the century lived William E. Leach, who contributed the part on Entomology (published in 1815) of "Brewster's Edinburgh Encyclopaedia." Leach gives us London records for *O. cancellatum* and *G. vulgatissimus*. Later in the century W. Harcourt-Bath published his little

"Illustrated Handbook of British Dragonflies" (1890), in which he collects together the names of all the known localities for the different species, including many in the London area. At the very beginning of the 19th century, Henry Doubleday, the well-known British Lepidopterist, collected and recorded several interesting dragonflies in Epping Forest and neighbourhood, and at the beginning of the present century. the Campion brothers did this in the same locality.

From these older records it can be seen that some favourite collecting grounds have now gone for ever and others are no longer what they were. In the first category must be included the marshes at Deptford and Bermondsey, Battersea Fields and the Croydon Canal. In the second category I would place the Hackney Marshes, the Chingford area of Epping Forest, Wandsworth, Tooting and Clapham Commons. Now, we have lovely natural areas such as Hampstead Heath and Richmond Park, threatened with an excess of zeal for "tidying up." About thirty years ago, London began to increase rapidly in size and many open spaces were either built over or closely surrounded by the built-up area and the less common species tended to retreat. However, so much building created new breeding localities in the form of hundreds of gravel pits and several reservoirs, which have shallows for reeds to grow. During the last war, these breeding places were augmented by numerous bomb craters, which the dragonflies were exceedingly quick in colonising. It will be seen that although bog and marsh and some river species have lost ground, no doubt for ever, the pond dwellers have gained considerably. We have largely to thank the Metropolitan Water Board for this, as they have assiduously kept the worst forms of pollution away from waters in our area, a most essential condition for the growth of aquatic insects.

Surrey is still the county richest in species, with 29 and only three lost, but Middlesex, with 25, rather surprisingly has still as many as our portion of Herts and only three less than Essex. Middlesex has only lost three, to Herts' one and Essex's seven. Herts has four extra species for the county not yet recorded in the London area and Essex has three. Twenty species are to be found in North Essex (Ei—19) beyond our very small triangle, but I believe we should be able to record several of these inside our area. Within our boundaries, West Kent now has 19 species and has lost four, while ten extra species are known from the county, mostly near the south coast. Our portion of Bucks has 17 species and has lost none, while I know of only three other species for the whole county.

A certain amount of selection is no doubt shown by the above figures, certain counties having been more popular than others with collectors, but not enough to make a great deal of difference. On the other hand, there is a considerable difference in the number and/or accessibility of suitable breeding localities. Surrey has by far the most waters accessible to the Londoner. Middlesex beats it for quantity of breeding sites, but most waters are in the hands of corporations or private firms and are difficult of access. Both Herts and Essex are well supplied with suitable habitats, but many are enclosed on private estates. Kent on

the other hand, at least north-west Kent, has extremely little standing water, but what there is, is mostly accessible to the public. Many of the suitable waters in our corner of Bucks can be approached and indeed, most of the county records are from this portion, small as it is. When it comes to flowing water, the London area is extremely well supplied and in most cases the canals and long stretches of the rivers and streams are accessible.

PRESENT DISTRIBUTION IN THE LONDON AREA.
(Past records in square brackets.)

NAME.	M—21.	H—20.	E2—18.	Ei—19.	K—16.	S—17.	B—24.
Agrion virgo	+	–	+	–	+	+	+
,, *splendens*	+	+	+	+	+	+	+
Lestes sponsa	+	+	+	–	+	+	–
,, *dryas*	[+]	+	+	–	–	–	–
Platycnemis pennipes	+	+	+	–	–	+	+
Pyrrhosoma nymphula	+	+	+	+	+	+	+
Ischnura elegans	+	+	+	+	+	+	+
[,, *pumilio*]	–	[+]	[+]	–	–	[+]	–
Erythromma najas	+	+	+	–	+	+	+
Enallagma cyathigerum	+	+	+	–	+	+	+
Coenagrion puella	+	+	+	–	+	+	+
,, *pulchellum*	+	–	[+]	–	–	+	+
Ceriagrion tenellum	–	–	[+]	–	–	+	–
Gomphus vulgatissimus	[+]	–	[+]	–	+	[+]	–
Cordulegaster boltonii	+	+	+	–	–	+	–
Brachytron pratense	+	+	+	–	–	+	+
Aeshna cyanea	+	+	+	–	+	+	+
,, *juncea*	–	–	–	–	–	+	+
,, *mixta*	+	+	+	–	+	+	–
,, *grandis*	+	+	+	–	+	+	+
Anax imperator	+	+	+	–	+	+	–
Cordulia aenea	+	+	+	–	+	+	+
Somatochlora metallica	–	–	–	–	[+]	+	–
Orthetrum coerulescens	[+]	+	[+]	–	–	+	–
,, *cancellatum*	+	+	+	–	[+]	+	–
Libellula quadrimaculata	+	+	+	–	–	+	+
,, *depressa*	+	+	+	–	+	+	+
[,, *fulva*]	–	–	[+]	–	[+]	–	–
Sympetrum striolatum	+	+	+	–	+	+	+
,, *vulgatum*	+	–	+	–	+	[+]	–
[,, *meridionale*]	–	–	–	–	–	–	–
,, *sanguineum*	+	+	+	–	[+]	+	–
,, *fonscolombii*	+	+	–	–	–	+	–
,, *flaveolum*	+	+	+	–	+	+	–
,, *danae*	–	+	+	–	+	+	–
[*Leucorrhinia dubia*]	–	–	[+]	–	–	–	–
32 species—4	25—3	25—1	25—7	3	19—4	29—3	17

There are one or more localities of particular richness in dragonfly species in all the counties, some luckily inside our boundaries and several tantalisingly just outside. Some of these localities have been well known since records were first kept. Such are: Hampton Court, Hampstead Heath, the Lea Navigation Canal, Epping Forest and Coopersale Common, Keston Bog and Ponds, Epsom Stew-Ponds, the Black Pond, Esher and the combined group of Surrey Commons round it, Wisley

Pond and those on the Commons surrounding it, the Basingstoke Canal, Richmond Park and Wimbledon Common, Virginia Water and Windsor Great Park, Runnymede and the neighbouring Thames backwaters. Although dragonflies have lost some natural breeding-sites in the very heart of London, others in the Parks and gardens are still inhabited by a few species, notably *Sympetrum striolatum*, and the latter species acquired new breeding sites during the last war, in emergency static water tanks. It may come as a surprise to many readers of this article, that out of 43 species of dragonflies acknowledged as British, we can still produce 32 in the London area.

This survey has been accomplished with the co-operation of my committee colleagues, C. J. F. Bensley, H. J. Burkill, L. Parmenter, R. M. Payne and E. B. Pinniger; and my good friends or correspondents, H. G. Attlee, K. G. Blair, F. R. Browning, L. I. Carrington, A. E. Gardner, C. O. Hammond, H. H. S. Hayward, E. L. Martin, M. Maynard, N. Moore, A. W. Richards, J. Riley, E. R. Speyer, B. R. Stallwood and A. J. A. Woodcock.

This paper has been prepared as one of a series of surveys of the insect fauna of the London Area initiated by the Entomological Section of the London Natural History Society.

PART II.

Agrion virgo (Linnaeus).—M—21, E2—18, K—16, S—17, B—24.

The Demoiselle Agrion occurs in most parts of the London Area, but nowhere really commonly and it would seem to be now in lesser numbers than about twenty years ago. J. F. Stephens and W. F. Evans used to take it in Hackney Marshes in the early 19th century, together with *A. splendens*, with which species they got it mixed, although the descriptions and illustrations enable one to sort them out. Modern records tell of Dr K. G. Blair taking one at Uxbridge, Middx., in 1907, and of a male seen on the Thames at Blackfriars on 25th July 1925 and another male taken at Strawberry Hill on 25th June 1947. It has not been seen in our part of Herts, but just north of our boundary on the Essex border. In the latter county, within our borders, it is now confined to the valleys of the Lea and the Roding, in both of which places it appears to be decreasing. In West Kent we have it on the River Darent up-stream from *splendens*. In Surrey it is plentiful in some years and is always to be found in suitable places. It particularly likes the parts of a fairly swift-flowing river or stream, that have a gravelly bottom and that are shaded by trees or bushes along the banks. These conditions are found on the River Mole, where the species breeds plentifully and from whence it strays onto the Commons around, such as Oxshott and Esher, West End, Cobham and Ockham. It has turned up on Surbiton Golf Course, at Claygate Brickfields and Brooklands Race Track. It also breeds in Bank's stream on Bookham Common. In Bucks I know of it from the Grand Union Canal and the Colne Brook, in which it breeds and where it is quite plentiful in some years.

Common on the wing in June and July.

Agrion splendens (Harris).—M—21, H—20, Ei—19, E2—18, K—16, S—17, B—24.

The Banded Agrion is widely distributed and a great deal more plentiful in our area than the preceding species. The two are both found on many of the same rivers and streams, but *splendens* likes the quieter parts with muddy bottoms and flowing through open country. It will also breed freely in lakes and ponds and is found on most of the canals. In the early 19th century it was common on the Hackney Marshes and I believe may still be found there. It swarms on the Thames and on the Long Water at Hampton Court and breeds in the Colne Brook and the rivers Colne, Gade, Chess, Lea, Stort and Roding. Formerly it was common on Ching Brook, especially where the Walthamstow Dog track now stands. It breeds freely in some of the ponds in Epping Forest and in Surrey in the Black Pond, Esher, in the ponds on Bookham Common and in Richmond Park. The rivers and streams in the southern half of our area are as plentifully supplied with this species as any of those previously mentioned. The Darent and the Mole are here the principal breeding grounds.

Common on the wing in June and July.

Lestes sponsa (Hansemann).—M—21, H—20, E2—18, K—16, S—17.

The Green Lestes has not yet been found either in N. Essex or Bucks with our boundaries, and is apparently a fairly recent arrival in both Middlesex and Herts. Breeding has not yet been proved in the former county, but it has been found in three separate localities so far, two of them within the London postal district. In Herts it has been known from the north-western side of our boundary since the beginning of the century, but is only really abundant at one water. I still have no other records from anywhere else in Herts beyond our borders. In Essex it is equally well established in the brackish coastal ditches and the numerous ponds of the Epping Forest and Coopersale areas. In Kent, the breeding habitats are comparable, the species being common in coastal districts well outside our area. However, it once turned up at Lee in 1900 and quite recently at another pond four miles to the south-east. It has also been taken at Waltham Abbey since 1927. It is only in Surrey that we can claim it as really common and widespread, where it has been breeding in the same ponds from the beginning of all our records. One locality no longer exists, the Battersea Fields, where over a hundred years ago W. F. Evans occasionally took it, and from whence came the specimen that he painted in 1845. It breeds on all the big Surrey Commons with ponds, such as Esher, Oxshott, West End, Arbrook, Epsom, Burgh Heath, Ockham, Bookham, Wimbledon and in Richmond Park. The same applies to all those Commons beyond our boundaries. It needs a thick growth of reeds or rushes at its breeding sites.

Plentiful on the wing in July and August.

Lestes dryas Kirby.—[M—21], H—20, E2—18.

The Scarce Green Lestes, very like the commoner species to look at, is, we hope, firmly established in Essex, but the localities are beyond our

borders, with the exception of one, discovered in 1943. Henry Doubleday knew of it at Coopersale Common in 1871, but it is no longer there. The status in the London Area is, on balance, much as it was at the beginning of the century, but with notable changes. A pond at Hanwell, where it used to breed, was drained and built over in 1903, but a new locality in Herts was established by 1946, although when is not exactly known. Like *sponsa*, it appears to shift localities on occasion and establish itself in a fresh area, but is in no sense a migratory species. It needs still water, choked with reeds or rushes, and should be looked for flying from the end of May to well into August.

Platycnemis pennipes (Pallas).—M—21, H—20, E2—18, S—17, B—24.

The White-legged Damsel-fly is purely a running-water species, but drifts frequently to the ponds on the Commons and in the Parks, within easy reach of its breeding waters. Both the Thames and the Colne are common breeding places in Middlesex, also the Grand Union Canal as near in as Southall. A specimen in the British Museum (Natural History) was taken on the Paddington Canal in 1863. In Herts it also is very common on the Grand Union Canal, and within our area is to be found on the Lea Canal, both in Herts and in Essex. In this latter county, the Roding valley is its stronghold, while it occasionally strays into Epping Forest. It has not been found on the Darent, I cannot think why, and the nearest reported breeding area in Kent is the River Medway. In Surrey it swarms both inside and outside our boundaries on the rivers Mole and Wey, also the Basingstoke Canal. In our small portion of Bucks it is common on the Colne Brook and on the Grand Union Canal.

It is flying at its best in June.

Pyrrhosoma nymphula (Sulzer).—M—21, H—20, Ei—19, E2—18, K—16, S—17, B—24.

It goes almost without saying that the Large Red Damsel-fly swarms all over our area, only the next species being equally common and widespread. The nymph does not mind in the least whether the water is still or moving, stagnant or fresh, alkaline, acid or slightly salt. It is dark-coloured, stumpy and rests on the bottom debris, with a preference for mud, although it has been found both on sand and gravel. It is equally at home in a huge lake or reservoir and in a garden pond, a large fresh-water marsh or a bog pool, a quite rapid river and a slow-moving canal. The nearest point to London's centre where the imago was reported in 1942 is Wood Green, Middlesex. The red female colour form (*fulvipes*) has been taken several times within our boundaries.

The species has a long season on the wing, but is most plentiful in June and July.

Ischnura elegans (Van der Linden).—M—21, H—20, Ei—19, E2—18, K—16, S—17, B—24.

The Common Ischnura is equally common as the above, but needs growing plants or water-weeds in its breeding place, to which the nymphs

cling. They are at home either in still or running water, from large lakes to tiny ponds, marshes to bogs, large rivers to small streams, canals to ditches, but always there must be plenty of vegetation. The bottom soils are immaterial, whether mud, clay, gravel, sand or peat, and it does not mind limestone or even a little chalk. Water can be alkaline, acid or absolutely brackish. It has established itself nearer in to the centre of London than *nymphula*, being quite common at Syon House, Chiswick House, Wood Green, the Highgate ponds, Kew Gardens, Putney Heath, Battersea Park, Hampton Court and Bushy Park. The different female colour forms are all to be found in our area.

With a long season on the wing from May to September, it is certainly most plentiful in June and July.

[*Ischnura pumilio*] (Charpentier).—[H—20, E2—18, S—17.]

This rare species, the Scarce Ischnura, is not at present to be found within our area, but it is still a possibility that it may occur again. Owing to its very small size and close resemblance to the Common Ischnura, it can be easily overlooked, but it also seems to have a curiously intermittent occurrence in this country, as we know from the way it vanishes entirely and reappears again at many of its well-known pools. It likes a peaty runnel or seepage from a bog, however small in area. In 1871 Henry Doubleday recorded it as " rare about red gravel pits in Epping district." Eminent entomologist as Doubleday was, the habitat described is such a very peculiar one for *pumilio* that the record is open to doubt. The same cannot be said for H. G. Attlee's records for Richmond Park in the years 1931 and 1932, as he carefully described the species' characters at the time. The little boggy runnel at the corner of a pond near Kingston Hill Gate produced two males and two females taken (one being form *aurantiaca*) and a dozen more counted, between the 24th May and 27th June, and the following year Attlee counted at least two dozen males and about the same number of females, both of typical and *aurantiaca* colour forms, the latter being now considered by taxonomists as merely a teneral stage. The seepage from this bog was unfortunately piped in 1933 and *pumilio* has not been seen since. Just over the Surrey border, in N.E. Hants, a flourishing little colony has recently been discovered. In 1948 on the 4th August a male was taken by E. R. Speyer, only two miles due north of our Herts boundary. The identification was confirmed at the British Museum (Natural History). The species can be distinguished from its very common relative, by not having an upright projection on the centre lobe of the prothorax and by the pterostigma in the forewings being noticeably larger than that of the hindwings.

It is flying between the end of May and the beginning of August for about eight weeks.

Erythromma najas (Hansemann).—M—21, H—20, E2—18, K—16, S—17, B—24.

The Red-eyed Damsel-fly is fairly plentiful in our area, breeding mostly in the lakes and ponds, but also in the slow-flowing canals. In

Middlesex: Enfield, Ruislip, Stanmore Common, Hampstead Heath, Hampton Court or Staines Moor are the best places to look for it. In Herts: Aldenham Reservoir and the Lea Canal; in Essex: at the ponds in Epping Forest. In Kent: the insect is now to be found at Keston and the only old record I have for the whole of the county, is a specimen in the British Museum (Natural History) taken at Forest Hill on the 7th June 1865. In Surrey it is equally plentiful within as without our boundaries, breeding on most of the Commons and in the lakes such as Virginia Water. In the London Area it can always be found at the Basingstoke Canal, Epsom Stew-Ponds and Kew Gardens, and has been taken in Richmond Park, on Arbrook Common, at Brooklands and at Ockham Common. In Bucks, I can always find a few on the gravel pits about the Colnbrook By-Pass or on the adjacent Grand Union Canal.

June and July are the best months to see it on the wing.

Enallagma cyathigerum (Charpentier).—M—21, H—20, E2—18, K—16, S—17, B—24.

One would expect the Common Blue Damsel-fly to be very plentiful in our area, as we are well endowed with the type of large expanses of still water that it likes. Neither will it despise smaller ponds and gravel pits, nor the salt marshes of the Thames estuary. It used to be found in the last century at Battersea Fields and near Forest Hill and Sydenham, but at the present date the nearest points to Inner London where it breeds are Bushy Park, Hampton Court, Wood Green, Hampstead Heath, Epping Forest, Walthamstow Reservoirs, Keston Common, Kew Gardens, Wimbledon Common and Richmond Park.

Flying most plentifully in June and July.

Coenagrion puella (Linnaeus).—M—21, H—20, E2—18, K—16, S—17, B—24.

The Common Coenagrion is exceedingly plentiful in the London Area, but is not quite so universally distributed as the previous species. It will appear literally in swarms in many places. It breeds in fresh-water ponds, lakes, ditches and slow-moving canals, always preferring rather small expanses of still water, although the adults will be found commonly along the grassy edges of our rivers and streams and at the shallower ends of reservoirs. It will avoid really salt marshes and absolutely acid peat bogs, but otherwise is not particular about the types of soil, water or vegetation. It likes a lot of the latter, to which it clings as a nymph and in which it lays its eggs as an adult.

It used to be found on Tooting Bec and at Lee and Forest Hill, but now the nearest to the great built-up area, taking our usual course from Middlesex in a clock-wise circle, are the following places: Syon House, Chiswick House, Hampstead Heath, Hendon, Wood Green, Mitcham, Putney Heath, Kew Gardens and Wimbledon Common. Just beyond this inner circle, it is to be found on all the Commons, Sewage Farms and Parks; in Epping Forest, in woods, at reservoirs, in the Darent and Ravensbourne valleys and the Basingstoke Canal. The only curious exception to the general abundance of *puella* is in the county of Bucks.

Here it has been reported, but not commonly, from the Grand Union Canal within our boundaries and from Eton and Burnham Beeches just outside our area, but I have never come across the species at any of the gravel pits, nor has anyone recorded it elsewhere in the county.

It has a long season on the wing, but is most plentiful in June and July.

Coenagrion pulchellum (Van der Linden).—M—21, [E2—18], S—17, B—24.

The Variable Coenagrion, although abundant where found, is not a common species. Nevertheless, we have a few of its breeding places within the London Area, and a few more just without. One of the latter is the Basingstoke Canal in Surrey, the best stretch for dragonflies being on the far side of our boundary. However, *pulchellum* has been taken at Weybridge, which we can claim as ours. In 1844 W. F. Evans took it in Battersea Fields in July. In Middlesex and in Bucks it is quite common in the Staines district. In Essex it was reported by Doubleday, at the end of the 19th century, as "not common at Epping," but has not been known anywhere in the county since that time until it was seen at Foulness in 1943. In Herts and Kent there are old records, but well outside our boundaries. The ecology of this species is still imperfectly known. There is some suggestion that it replaces the Common Coenagrion in some of the breeding areas: where one is found, the other is not. In our area there is no indication of this, and the two species occur together.

It is flying most plentifully in June and July.

Ceriagrion tenellum (Villers).—[E2—18], S—17.

The Small Red Damsel-fly had the scientific name of *Palaeobasis tenella* in my first book on the "Dragonflies of the British Isles," but further knowledge has led the taxonomists to the decision that it should not be separated from the genus *Ceriagrion*. However unfortunate a change of name may be, it makes no difference whatever to the status of the species, and *tenellum* is still holding its own within our boundaries. It used to be much more plentiful than now. W. F. Evans knew of it from Weybridge in the 19th century and a specimen from there is the one figured in his book in 1845. It was formerly at Epping, probably on Coopersale Common, which was richer in species in the last century than it is now. Early in this century it was plentiful on Esher Common, and is still to be found very sparingly within our part of Surrey. It is abundant on several of that county's Commons outside our boundary. It requires boggy and marshy conditions, and can be told at once from the very common Large Red Damsel-fly by its entirely light-coloured (yellow or red) legs.

It is most plentiful on the wing in June and July, but is sometimes about in May, or still out in September.

Gomphus vulgatissimus (Linnaeus).—[M—21, E2-18], K—16, [S—17].

The Thames valley is one of the breeding places in England of the Club-tail Dragon-fly and it is still plentiful near Oxford. One was

taken in 1900 at Walton and Leach, in 1815, records that it is " occasionally taken near London." These specimens were no doubt from nymphs washed down river in times of flood. A few stray specimens were known from other parts of the London Area. Donovan had one taken before 1807 at Highgate; Doubleday recorded it from near Epping before 1903 and McLachlan from Weybridge in 1871. How it got into the Kent locality I have as yet no idea, as it has never been seen there before or since, although it was formerly known in the county. We have not proved breeding in the Darent river, the most probable habitat, and yet several were seen and one taken, just over a mile away in June 1939. It is hardly likely to become established in our area, as it was so infrequent there when conditions were much more favourable.

Cordulegaster boltonii (Donovan).—M—21, H—20, E2—18, S—17.

One associates the Golden-ringed Dragon-fly with country of the type round Highland burns and wild Welsh glens and it is somewhat surprising how abundant it is on the southern Commons of England. It breeds mostly in flowing water, but the nymphs have been found in ponds, and the adults will often be found there and at fresh-water marshes. To the London Area it seems only to be a wanderer, with the possible exception of Surrey, where it may have bred on Wimbledon Common, as it has been frequently seen there. It is an abundant resident of the Commons further south. In Middlesex, a female was taken at Haverstock Hill in July 1900. In Herts, it was seen in the St Albans district in 1911. In Essex, one was taken by E. B. Pinniger near Loughton in 1930. To return to Surrey, within our boundaries, a dying female was picked up on Esher Common in June 1900 and the late Rudge Harding used to see it occasionally in Richmond Park.

It should be looked for flying between late June and mid September.

Brachytron pratense (Müller).—M—21, H—20, E2—18, S—17, B—24.

The Hairy Dragon-fly is by no means a common species in the London Area, indeed, it is not really common anywhere in the British Isles, and always rather local. It breeds in both still and slowly moving water, but will be found equally hawking over open fen land or in, or about the edges of, woods. The best places in our area to find it are on the Grand Union Canal and the Basingstoke Canal, in Epping Forest, at gravel pits near Staines and ponds near Hertford, or on Esher or Bookham Commons.

It has an early season on the wing and should be looked for from the end of May, for about eight weeks.

Aeshna cyanea (Müller).—M—21, H—20, E2—18, K—16, S—17, B—24.

The Southern Aeshna is extremely common and widespread in the London Area. It always breeds in stagnant water, but so long as there is an ample supply of food, such as Chironomid larvae and tadpoles, it will happily survive the most intensive crowding and is a common resident of small ornamental garden tanks. We also know it as an abun-

dant breeder in gravel pits and the ponds on all our Commons and heaths, and in our Parks, woods and forests. The adults will visit the canals and reservoirs, also occasionally our smaller rivers and will frequently fly into buildings or along a London street.

Most plentiful on the wing in July and August.

Aeshna juncea (Linnaeus).—S—17, B—24.

The Common Aeshna, so-called because it is the most abundant and widespread, taking the British Isles as a whole, is, however, very unusual in our area, with the exception of a few of the Surrey Commons. There it breeds regularly and some can always be found between July and October, in a good year. It appears to prefer ample space and open marshes and ponds to breed in, but will also fly in clearings in woods and has been taken in towns, but not in London. Sometimes I believe it appears inside our boundary as an immigrant, as I am sure it must have done in Bucks in 1936, when I came upon quantities hawking about a gravel pit near the Colnbrook By-Pass. In Herts it frequents a Common just beyond our boundary and in Kent it is usually abundant on the Medway marshes, which we also cannot claim as ours.

Aeshna mixta Latreille.—M—21, H—20; E2—18, K—16, S—17.

The Scarce Aeshna is scarce as a resident, but being very definitely a migrant from the Continent in most years is, as one would expect, a regular visitor in some numbers in the London Area. It is also now well established and breeding at Ruislip, in Epping Forest and on the Basingstoke Canal, together with other localities just beyond our boundaries. It was known in Stephens' time from Southgate, Hertford, Epping and Dartford, and between 1909 and 1939 specimens were recorded from a garden in Tufnell Park Road, the gardens of the British Museum (Natural History), Soho Gardens, Pinner, Mill Hill, Hayes, Upper Norwood, Beddington, Wimbledon Common and Richmond Park. It has recently been recorded from Staines Moor, Osterley Park and Wood Green in Middlesex; from Aldenham Reservoir and the Lea Canal in Herts; from Hainault Forest, Ongar Park, Coopersale Common and Chingford surburban gardens in Essex; from Westerham in Kent; from Ham gravel pits, Esher and Oxshott Commons in Surrey and is absent only from our small portion of Bucks. It is the considered opinion of us all that within the last ten years it has greatly increased.

It is a late flyer, appearing and ovipositing in August and September.

Aeshna grandis (Linnaeus).—M—21, H—20, E2—18, K—16, S—17, B—24.

The Brown Aeshna is probably as common in the London Area as *cyanea*, but, although it ranges far and wide, even into the City itself, into the gardens, parks and woodlands, it needs quite a fair sized lake, pond or canal to breed in. I do not think that it will be found in small garden tanks. It is a prolific breeder and a powerful insect and there are few situations where it will not be found. For all the love that the Aeshnines show for the sun, usually re-acting with remarkable rapidity

to temporary overclouding, yet *grandis* will fly very late into the dusk of a warm summer's evening, assiduously scooping gnats and midges into its mouth, making a strong rustling with its wings as it banks and turns. As far as our information goes, the nearest waters to central London, where it breeds, apart from merely visiting, are Syon House, Hampton Court, Wanstead Reservoirs, Kew Gardens, Wimbledon Common and Richmond Park. Just beyond these localities it is to be found abundantly at all suitable waters in every county in our area.

Flying most plentifully in July and August.

Anax imperator Leach.—M—21, H—20, E2—18, K—16, S—17.

This large and handsome Emperor Dragon-fly is probably commoner in the London Area, than anywhere in the British Isles. Being a powerful flyer it often ranges far from its breeding water and will fly until dusk in the summer. However, like most Aeshnines, it is a true sun-lover. I believe that it has increased considerably during the present century. In Stephens' time he knew of it from Arno's Grove, Hertford, Epping, Wandsworth and Wimbledon Commons. We now have it recorded from Hampton Court, Stanmore Common, Hampstead Heath, Wood Green, Whitewebbs Park, Aldenham, Shenley, St Albans, Hatfield Great Wood, Hertford Heath, Cheshunt and Hoddesdon district, Hainault Forest, nearly all the ponds in Epping Forest, Brentwood, Keston Common, Croydon, Beddington, Mitcham, Tooting, Godstone, Epsom and Ranmore Commons, Claygate, Leatherhead, Esher, Oxshott, West End, Arbrook and Bookham Commons, Wimbledon Common, Richmond Park, Kew Gardens and Putney Heath. From the latter pond 80 exuviae were counted on May 18th, 1945. It also breeds in and near the Basingstoke Canal from Weybridge out beyond our boundary. The Emperor was one of the first species to colonise the bomb craters in and round London, as a few growing reeds or rushes seem to suffice and it is apparently indifferent to crowded conditions. Small or large ponds, canals or ditches, lakes or meres, all are equally acceptable, so long as there are clumps of upright growing water-plants. Hard or soft mud, clay, gravel or sand are the usual bottom soils, but it does not mind a little lime, chalk or peat It will also breed in quite brackish water. I have not seen it in our portion of Bucks, but it is found just beyond our boundary.

This is a very early Aeshnid on the wing and is common in June and July.

Cordulia aenea (Linnaeus).—M—21, H—20, E2—18, K—16, S—17, B—24.

The Downy Emerald is plentiful and widespread in the London Area and is also definitely increasing as a breeding species. It likes ponds with a lot of growing vegetation or weed-filled canals and is known to breed in many quite small pools, although preferring the larger ones. It seems equally happy on an open Common or in thick woods and I am of the opinion that it will move considerable distances from its breeding localities. Stephens knew of it as plentiful at Woodford and to be found

at Epping and now it is to be seen at all the larger ponds in the Forest. Donovan took it at Hampstead in 1805, but it has not been reported again from there. It has been taken at Stanmore and at Hampton Court and is to be found near Staines and at Syon House. In Herts it is seen occasionally at Radlett, Aldenham, Shenley and Bricket Wood. In Kent it is common on the Keston and Chislehurst ponds. In Surrey it breeds regularly in the Black Pond, Esher, the Epsom Stew-Ponds and the Basingstoke Canal between Weybridge and Basingstoke. It used to breed in Richmond Park before the War and probably at Wimbledon Common and still does so sparingly at Bookham Common. I have found it in one of the big gravel pits in Bucks and it is breeding in other localities in that county.

It varies according to the weather in the time of its appearance on the wing, but can be safely looked for in June.

Somatochlora metallica (Van der Linden).—[K—16], S—17.

The London Area contains one of the rather few known localities in the British Isles of the Brilliant Emerald, and I believe the place is so well known that I shall not be giving it away when I state that it is the Basingstoke Canal between Weybridge and Basingstoke. From there it has strayed at times to Brooklands and Wisley Common. Stephens recorded it from Kent and as rare in June in the Metropolitan area but, as I have mentioned in Part I, his area stretched a good deal further south and east than ours and the record may have come from beyond our boundary and near a present-day Sussex locality. It frequents the same types of waters, at the same time of year, as the preceding species, but I fear that it does not show the same capacity for increasing. Possibly *aenea* is the dominant species and it cannot successfully compete with it. We need to know more of the ecology of both.

Orthetrum coerulescens (Fabricius).—[M—21], H—20, [E2—18], S—17.

The Keeled Orthetrum is really a marsh and moorland bog species, which has possibly fairly recently taken to inhabiting ponds on our southern Commons, and rivers beyond our boundaries. Donovan tells us of a colony at Hampstead about 1800, entirely gone by 1808. He figured the species correctly from one of them. The Campion brothers found it at the Ching brook in 1900. In Herts it can still be found in two districts, both within our area. In Surrey, although most abundant outside our boundaries, it has turned up occasionally at Littleworth, Esher and near Weybridge.

It should be looked for on the wing in July and August.

Orthetrum cancellatum (Linnaeus).—M—21, H—20, E2—18, [K—16], S—17.

The larger Black-lined Orthetrum is far more abundant and widespread in our area than *coerulescens*, because it is even more adaptable. It breeds equally in large marshes (fresh or brackish) and in reservoirs, in gravel pits or bog pools, in slow-moving rivers and canals, or in

lakes, ponds or fen dykes. Like the previous species, the nymphs bury themselves in the debris on the bottom and are not particular about the growing vegetation. Even the adults are just as contented in resting on the bare ground as on the reed stems. It has not been established as breeding in Middlesex, but there are numerous records from the county, since Harcourt-Bath recorded it from Kilburn up to the present day. In Herts it can be found in the St Albans district, at Aldenham Reservoir and the Lea Canal. In Essex it breeds in Hainault Forest but, for some unexplained reason, has only been taken twice in Epping Forest. In west Kent, Stephens said it was " not uncommon " in June in the marshes at Crayford and Dartford and Harcourt-Bath added Oak of Honour Wood. Now it is only found in east Kent, nearer to the sea. In Surrey it is a common resident outside our area. and within our boundaries it appears to breed regularly in small numbers at numerous waters, such as Beddington, Epsom, Esher and Richmond. Leach recorded it in 1815 as " common on the Croydon Canal " and Harcourt-Bath confirmed this and also added Peckham. As yet I have not found it in our portion of Bucks, nor is it recorded from anywhere else in that county. I would be inclined to say, from its distribution in the British Isles, that it had taken comparatively recently to an urban existence.

It should be looked for on the wing from June to August.

Libellula quadrimaculata Linnaeus.—M—21, H—20, E2—18, S—17, B—24.

When one considers the widespread distribution of the Four-spotted Libellula in the British Isles and in addition its great migratory powers, it is surprising how scarce and local it is in the London Area. It is undoubtedly one of the easiest of our dragonflies to recognise in flight, so it would not be for want of identification that it is so seldom reported. The only records for Middlesex are of one from Hampton Court by H. G. Attlee and a male taken at Wood Green in June 1942 by C. O. Hammond. In Herts it has been recorded in odd years since 1909, mostly just beyond our boundaries and either singly or in twos or threes. Only in 1919 at Shenley was it reported as " very frequent," presumably owing to an immigration in that year. In Essex a " migration swarm " was noted in 1888 and the species has been pretty regularly recorded from Epping Forest since then. In the early part of this century, although breeding, it was considered to be always scarce, but evidently has increased as a breeder, as it is now considered to be common in the Forest.

It has not yet been seen in north-west Kent, although moderately frequent along the south-east coast from migrations and no doubt also breeding in suitable places. It is Surrey that undoubtedly receives the bulk of the immigrants and also has the largest breeding population in the London Area. The species has always been a common resident at the Black Pond, Esher, since first recorded in the last century. Also it bred regularly in Richmond Park up to the War and is still to be

found on Wimbledon Common. It is plentiful at Bookham and Epsom and has been seen on the Basingstoke Canal inside our boundary, and frequently outside, breeding in bomb craters and gravel pits near-by. It is an inhabitant of still water, the nymph living on the bottom and not dependent on any growing vegetation, as even when ready to emerge, the nymphs crawl up the banks and not the plant stems. A protruding dead stick will do just as well as a live reed, as a perch for the adult insect. It certainly prefers peaty water and, as far as I am aware, has never bred in pure alkalines, but is common in both fresh and brackish marshes. It also breeds freely in muddy little ponds, as well as gravel and brick pits. In Bucks it breeds quite regularly in a few places beyond our boundary, and one adult male was taken by me beside the Colnbrook By-Pass in 1946. The darker-patterned form *praenubila* is occasionally found in the London Area.

The species usually has a flying season of from three to four months and is most plentiful in June and July.

Libellula depressa Linnaeus.—M—21, H—20, E2—18, K—16, S—17, B—24.

Not so common in the whole of the British Isles as the previous species, nevertheless the Broad-bodied Libellula is a common resident in the south of England and more abundant in the London Area than the Four-spotted. It is also a migrant, but has not been seen in swarms. It seems to like particularly the crowded breeding conditions of small ponds, garden tanks, clay pits or bomb craters, being one of the first to colonise the latter sites. The nymph lives on the muddy bottom and crawls out on land to emerge and is in no way dependent on vegetation, except as a resting place for the adults. The species seems more tolerant than the preceding in its choice of water. Although freely found in fresh and brackish marshes, peat bogs and Common-land ponds, it is also quite an abundant resident of lakes, reservoirs, canals, ditches as well as the assortment of small pools enumerated above. The nearest it has been found to the heart of London is at the following places: Syon House, Hendon, Finchley, Wood Green, Chingford, Eltham, Mitcham, Putney Heath and Kew Gardens. Beyond this inner ring, the species is well distributed over all our area and can be looked for on the wing in early summer and well on to August.

[*Libellula fulva* Müller].—[E2—18, K—16].

The Scarce Libellula has not, it would seem, been able to adapt itself to encroaching bricks and mortar. Doubleday reported it in Ongar Park Woods late into the 19th century, but it is no longer there. The nearest to London was one taken at Colchester in 1905 and the nearest known colony to the north is now on the Suffolk Stour. Stephens gives it (1836) for Deptford and Bermondsey and Evans (1845) for Herne Bay, but it has not been found in Kent nearer than the Sandwich and Deal districts in later years. Although it breeds in lakes, ponds and bog pools, it also likes slow-moving muddy streams. I doubt that we shall be able to record it again in the London Area.

Sympetrum striolatum (Charpentier).—M—21, H—20, E2—18, K—16, S—17, B—24.

The Common Sympetrum is truly a City resident, as it breeds in our Inner London parks and gardens, and in emergency water tanks and bomb basements. It is a frequent immigrant from the Continent, and our breeding population is no doubt often augmented in that way. The species likes mud at the bottom of the pool and, for preference, plenty of growing weed, but is not particular either about conditions, soils or water constituents, so long as it is stagnant. The adult insects will sit about on the paths or roadways sunning themselves and will often rest with outspread wings on human beings. The Common Sympetrum is found at all still waters in the London Area, that are possible for a dragonfly to inhabit.

It has a long season on the wing from June to November, in good years, but is most plentiful in August and September.

Sympetrum vulgatum (Linnaeus).—M—21, E2—18, K—16, [S—17].

This very scarce Vagrant Sympetrum, exceedingly difficult to differentiate from the preceding, is always a visitor when found in this country. Out of eight authentic records, five have been from the London Area. The first published record was of a male from Richmond Park in 1898. In 1906 a male was taken at Epping, in 1925 a female was caught at Keston and in 1946 a male was taken at Enfield West. This species is common on the Continent and migratory, but appears only to visit us singly. It inhabits more mountainous regions than the Common Sympetrum and is usually flying earlier in the year. For this reason a very mature-looking Sympetrum seen in June should always be carefully examined. However, most of our known specimens were captured in August or September.

[*Sympetrum meridionale*] (Selys).

There are only two authentic British records of this species, which is a migrant and very abundant in south-west Europe. One record, at least, is from our area, as de Selys wrote in 1841, " a single female specimen from the environs of London, in Mus. Evans," and adds: " another in the collection of Mr Wailes of Newcastle, but from the south of England." Harcourt-Bath writes in his little Handbook of 1890: " Two females from the Metropolitan district, one in Mr Evans' and one in Mr Wailes' collection," so it is just possible that both specimens came from within our boundaries. It seems rather strange that so few have reached us and it is advisable, especially during a " *fonscolombii* " immigration year, to keep a sharp watch for a large, very light yellow-coloured Sympetrum of *striolatum* shape and size.

Sympetrum sanguineum (Müller).—M—21, H—20, E2—18, [K—16], S—17.

The Ruddy Sympetrum is both a local resident and an immigrant in the south of the British Isles and is probably slowly increasing as a

breeder. Like all immigrants, the yearly status fluctuates considerably and for a number of places where it has been taken there are only single records. It is fairly easily recognised in the adult stage, as the flight is rather fluttering and butterfly-like and the colour of a mature male is blood-red instead of vermilion-red. Females and young are not so easy to tell and the nymphs seem rather difficult to find. Mr A. E. Gardner discovered why so few of us had taken the nymphs alive. He says: "scooping about in the rushy shallows and in open water is quite unproductive, as the nymphs keep to the roots of the Great Reed-Mace—*Typha latifolia* Linnaeus." It is therefore, likely to be breeding in any lakes or ponds where this plant grows, and indeed we already had ample proof of breeding, by cast exuviae and freshly emerged imagines. After a migration, from one to four specimens are often to be found with other species of the genus, but it is also numerous at several localities in Middlesex, Herts, Essex and Surrey, where it breeds. Stephens took it at Colney Hatch and at Deptford early in the last century and Evans found it at Battersea Fields in 1844. I have no recent records for our north-west corner of Kent, nor for our strip of Bucks, although the species is found at Slough, just beyond the boundary. In Middlesex there is a good colony at Ruislip and it has turned up at Hampton Court, Syon House, Chiswick Park and Wood Green. In Herts it is known from Shenley, Aldenham, Bricket Wood, Hertford Heath and Broxbourne, but I do not know the breeding status. In Essex, Stephens took it at Epping and it is common at the ponds in the Forest, at Coopersale Common and at Ongar Park. It was once abundant at Chingford and still turns up, at times, on the Walthamstow Reservoirs. It breeds commonly in Hainault Forest. It is found yearly at all suitable ponds on the Surrey Commons and certainly breeds in many, if not in most.

It is flying most plentifully in August.

Sympetrum flaveolum (Linnaeus).—M—21, H—20, E2—18, K—16, S—17.

The Yellow-winged Sympetrum is a frequent immigrant into the British Isles and would seldom be overlooked, on account of its fluttering flight and bright yellow wing bases. Breeding has never yet been proved, but owing to an accumulation of facts, I have little doubt that it has taken place more than once. In 1871 Robert McLachlan found the insect, as he writes: "exceedingly abundant in the London district, I even saw several examples in the Strand!" Since then it has turned up in Middlesex at Ruislip, Pinner, Enfield West and Wood Green; in Herts at Shenley, Bricket Wood, Barnet and Hertford Heath. It was taken by Stephens at Epping before 1837 and there have been several records from the Forest subsequently. In West Kent it has quite recently been taken at Abbey Wood and at Swanscombe, but as one would expect it is most often met with at the Surrey ponds. It frequents those with growing reeds or rushes, on which it likes to sit half-way down with wings outspread.

It usually visits us in August; occasionally towards the end of July or the beginning of September.

Sympetrum fonscolombii (Selys).—M—21, H—20, S—17.

The Red-veined Sympetrum is a less frequent visitor, or is perhaps less likely to be recognised as a rarity. When only sub-adult it is very like either *striolatum* or immature *sanguineum*, but when fully adult (the condition in which we usually see it), the very red veins give off a "bluish" tinge as it skims about. It has been proved to breed on several occasions and we can boast of having in the London Area the first breeding record for England. This was at Ruislip in 1922, recorded by K. J. Morton. In 1946 several of the insects were again found in Middlesex, this time at Enfield West by C. O. Hammond. In Herts, two worn males were taken near Shenley in 1908 and a female at Aldenham Reservoir in 1910. The eminent Belgian odonatist de Selys Longchamps wrote in 1846: "a female specimen in the collection of Mr Stephens, he thinks he took it near London." The specimen is still in the Stephens' collection at the British Museum (Natural History), but without any data. In 1892 seventeen males were taken by C. A. Briggs on Ockham Common, Surrey, at a pond only a few yards outside our boundary. In 1911 the species was seen at Merton and in 1941 several were taken on Wimbledon Common.

The species usually reaches us a little earlier in the summer than *flaveolum*, but they seldom arrive in the same years, as the former mostly comes from the south-east and *fonscolombii* from the south-west. It is to be deplored that these dragonflies are killed on arrival, as they might quite possibly become established in time. They would seem to require much the same conditions as *flaveolum*, possibly with plenty of growing water-weeds as well as clumps of rushes.

Sympetrum danae (Sulzer).—H—20, E2—18, K—16, S—17.

The Black Sympetrum within the British Isles is truly a Scottish dragon-fly and keeps mostly to the far north in Europe and America. However, it has a few long established homes in the south of England in ponds and pools on swampy heaths. One of these habitats is the Black Pond, Esher Common and another was in Richmond Park, up to the War. Whether the interference with the ponds there has now wiped out the colonies, I have not yet ascertained, but I fear that several of the less common breeders may now be gone for good. It also breeds sparsely at Bookham Common and has been seen at Wimbledon Common. There were a few reported in the St Albans district of Herts in 1911 and one turned up in 1929 just north of our boundary. The species was known from Epping Forest before 1845 and has been found there ever since, but is never common. I found one adult male on the River Darent, Kent, on August 17th, 1947. There are no records for the species from the county of Bucks. It never seems to have established itself in Windsor Great Park, as suitable a locality, one would have thought, as Richmond. Some of the sporadic occurrences are no doubt due to immigration. Although not known as a regular migrant it has been known to migrate in some European lands, so probably sometimes accompanies other dragonflies across the North Sea

It is flying most plentifully in August and September.

[*Leucorrhinia dubia*] (Van der Linden).—[E2—18].

The White-faced Dragon-fly is a rare inhabitant of several scattered localities in the British Isles and has already gone from some where it once bred. It is none too easy to see as it skims over the heather round its peaty breeding pools and so it is always possible that fresh localities may still become known. It is hardly likely to be found in the London Area again, as suitable breeding grounds get scarcer as the years pass. The alternative habitat in the British Isles is sphagnum bog, and this we no longer have within our boundaries. In 1843 Doubleday took it on Coopersale Common, Essex, and one of his specimens is in the Dale collection at Oxford. W. F. Evans says Stephens also found it at Epping and the former sketched one of them for his book printed in 1845. There are two males in Stephens' collection in the British Museum, but without data. The nearest locality to London now known is a Surrey bog some miles to the south-west.

It is an early summer species and may be seen flying from the end of May to the end of July.

A Check-List of the Mammals, Reptiles and Amphibia of the London Area, 1900-1949.

By R. S. R. Fitter.

THE Area covered by this paper is that usually taken by the London Natural History Society, the twenty-mile radius from St Paul's Cathedral, comprising the whole of Middlesex, large parts of Essex, Hertfordshire, Kent and Surrey, and a small portion of Buckinghamshire. Within this Area 32 mammals, four reptiles and five Amphibia are at present resident in a feral state; the status of four mammals (greater horseshoe bat, Natterer's bat, harvest mouse and roe-deer) and one amphibian (natterjack toad) is uncertain. Of the residents, four mammals occur as a result of being introduced to the British Isles by human agency within the past thousand years, viz., rabbit, black rat, brown rat and grey squirrel. It is to be expected that this number will be increased within the course of the next ten or twenty years by the advent of the fat dormouse and various species of deer, now known to be living as feral escapes within a few miles of the boundary of the Area. The barbastelle bat, the common seal, and four cetaceans have occurred within the Area as vagrants within the past fifty years, and it is noteworthy that the occurrence of one of the cetaceans, the narwhal, ranks as only the fifth record for the British Isles. In addition, several species have occurred purely as escapes from captivity, though a feral colony of one of these, the coypu, exists only a few miles outside the Area.

The Ecological Section's scheme for recording mammals, reptiles and Amphibia started in 1936, and this is the first full paper resulting from it. Previous papers (Fitter, 1936, 1938, 1939, 1942) have been only of the nature of progress reports. The author's best thanks are due to all those members of the London Natural History Scciety who have contributed notes to the recording scheme, and it is regretted that it is not possible here to list again those whose help has been acknowledged in previous reports. A special degree of thanks is due to the following, who have supplied information and answered queries: Miss C. M. Acland, Michael Blackmore, Bureau of Animal Population, Lt.-Col. E. N. Buxton, C. P. Castell, Geoffrey Dent, C. C. Fagg, James Fisher, F. C. Fraser, David Harrison, R. W. Hayman, the late G. Seccombe Hett, Major Maxwell Knight, T. C. S. Morrison-Scott, Christopher Mott, the late L. G. Payne, Miss Frances Pitt, S. Rata, R. H. Ryall, Malcolm Smith, Brian Vesey-Fitzgerald, Mrs M. Vizoso, and officials of the following hunts: Bolebroke Beagles, Buckinghamshire Otter Hounds, Eastern Counties Otter Hounds, Enfield Chace, Essex, Essex Union, Old Berkeley (East), South Herts Beagles, Surrey Union, West Kent, West Surrey and Horsell Beagles. Thanks are also due to those who have sent in records since the publication of the last progress report, viz., C. H. Andrewes, C. B. Ashby, S. Austin, F. Banfield, T. Bispham, H. J. Burkill, J. S. Carter, S. P. W. Chave, P. W. E. Currie, J. E. S. Dallas, R. I. Douglas, Miss K. Douglas-Smith, the late P. J. Hanson, E. O. Höhn, F. M. Holborn, A. B. Hornblower, K. E. Hoy, W. D. Melluish, A. F. Mitchell, E. T. Nicholson, E. C. Ormerod, A. L. Panchen, W. R. Philipson, E. B. Pinniger, A. C. G. Poore, D. A. Rawlence, J. E. and M. D. Roberts, J. Ross, A. V. Tucker, J. J. Vincent, W. G. Vincent, Mrs E. M. Watt, A. C. Wheeler, I. A. Williams, R. E. Windsor, the late W. A. Wright, J. F. Burton, F. G. H. Elphick, and A. Leutscher.

MAMMALIA.

INSECTIVORA.

Mole. *Talpa europaea* L.

Common in the rural parts of the Area, and comes as near the centre as Abbey Wood (1925), Wimbledon, Richmond Park, Hampstead Heath and Walthamstow Reservoirs.

Common Shrew. *Sorex araneus castaneus* Jenyns.

Common in the rural parts of the Area, and comes as near the centre as Abbey Wood (1925), Wimbledon, Mill Hill and Walthamstow Reservoirs. No records for Hampstead Heath since 1914.

Pigmy Shrew. *Sorex minutus* L.

Probably occurs throughout the rural parts of the area, but overlooked owing to small size, or confused with common shrew. The only actual records since 1920 are from Sevenoaks, Kent; Limpsfield and Wimbledon Common, Surrey; St Albans and Elstree, Herts; Mill Hill

district, Herts and Middlesex; and Epping Forest and Woodford sewage farm, Essex. Stated also to occur at Godstone, Surrey, and Parndon, Essex. In 1917 there were still some on Hackney Marshes (F. J. Stubbs). Two skulls, almost certainly of this species, were found in a tawny owl's pellet near St Margaret's, Herts., in October 1947 (Brown, 1949).

Water Shrew. *Neomys fodiens bicolor* (Shaw).

Before 1914 was found on many small streams in the rural parts of the Area, even apparently in Richmond Park. Since 1920, however, only three specimens have been recorded: at Godstone, Surrey, in 1922 (F. W. Frohawk), at Leatherhead, Surrey, in 1947 (J. E. S. Dallas), and at Great Parndon, Essex, in 1940 (G. Dent). Dent states it is seen occasionally in the moat of Passmores at Great Parndon, and used to occur regularly in ponds at Loughton, Essex, about 1923. According to J. F. Burton, it breeds quite commonly along the banks of a small stream in Sundridge Park, Kent.

Hedgehog. *Erinaceus europaeus* L.

Common in both the rural and suburban parts of the Area. Frequently breeds in suburban gardens, and in 1938 was stated to do so in Hyde Park. In 1946 one was found in the Zoo in Regent's Park, and in 1939 one occurred in a small garden in Old Brompton Road. In recent years has been recorded as near the centre of London as Charlton, Lewisham, Streatham, Clapham, Putney, Holland House (1922), Hampstead Heath, Walthamstow Reservoirs, Beckton and Bromley-by-Bow.

CHIROPTERA.

Greater Horseshoe Bat. *Rhinolophus ferrum-equinum insulanus* Barr-Ham.

Few certain records in the present century. The late G. Seccombe Hett saw it in an offshoot of the Chislehurst caves; said to have occurred at Hayes, Kent, in 1904 (Tutt 1909), and in August 1940 three large bats, the size of swifts, with an apparent protuberance on the head, were seen flying high over Beulah Hill (S. P. W. Chave). In August 1948 a large bat, almost certainly this species, was hawking moths round the lamps in Berkeley Square (B. Vesey-Fitzgerald). In the autumn of 1933 nine were released at the Zoological Gardens in Regent's Park by G. Seccombe Hett, who on one occasion between 1933 and 1939 saw one at the Open Air Theatre in Regent's Park.

Lesser Horseshoe Bat. *Rhinolophus hipposideros minutus* (Montagu).

The only reliable recent records for the whole Area are from the London parks. Blackmore saw it occasionally in Hyde Park and Kensington Gardens in 1936-39, and caught one near the Serpentine with a butterfly net in 1939; Millais (1904) also used to see it hawking over the Serpentine and Round Pond on summer evenings. Vesey-Fitzgerald saw it hawking in Regent's Park in 1924-27, but not since, and

took two specimens from the porch of H. G. Wells's house in Hanover Terrace, overlooking the park, in 1926. Fairall (1935) stated that it still occurred at Godstone, where Tomes found it not uncommon in the Greensand workings in the last century (*V. C. H., Surrey*). Stubbs (1917) had seen it at the Chislehurst caves, Kent, and G. Seccombe Hett also found it there.

Whiskered Bat. *Myotis mystacinus* (Kuhl).

Widespread in the London suburbs and beyond. The bulk of recent records come from B. Vesey-Fitzgerald, who has taken it, during 1921-45, in Dulwich, Streatham, Wimbledon, Southall, Mill Hill, Hendon and Highgate; he reports also that it is common at Purley and on Esher Common, Surrey, at both places being commoner than the pipistrelle. In the Sevenoaks district it is also commoner than the pipistrelle, and often found in the same haunts (D. L. Harrison, 1943). Five were seen on Ludgate Plain, Epping Forest, during 1946 (Tucker 1947). Stubbs (1917) said he had seen it " even in such places as Whitechapel." G. Seccombe Hett found it at Chislehurst caves some years ago. The other older records suggest that this bat was formerly widespread over the Home Counties, especially Essex, but not Herts.

Natterer's Bat. *Myotis nattereri* (Kuhl).

There are no recent records, and the older naturalists are somewhat vague. Stubbs (1917) said it was " fairly common in the suburbs . . . often haunts houses and gardens." Findon (1913) said that it " is or was common in Hampstead," as J. E. Harting had often observed it there. Tutt (1909) and Baker (1908) recorded it from the Chislehurst caves, Kent, where G. Seccombe Hett also saw it some years ago. Millais (1904) noted its occurrence in Regent's Park.

Daubenton's Bat. *Myotis daubentonii* (Kuhl).

Locally distributed near water throughout Area. Vesey-Fitzgerald has taken it on Blackfriars Bridge, and seen it over the Serpentine, the lake in St James's Park, and the Regent's Canal near the Zoo. Other recent localities include the Thames as far downstream as Richmond (sometimes in numbers), Kew and Putney, the Lea at Waltham Abbey, various ponds in and around Epping Forest, the lake at Moat Mount, Hendon, and the Brent Reservoir, where Vesey-Fitzgerald saw twelve in September 1937, one of which collided with a martin and fell in. Oldham (1911) recorded this bat from several parts of the Watford district.

Pipistrelle. *Pipistrellus pipistrellus* (Schreber).

Common throughout the London Area right into the heart of Inner London. Vesey-Fitzgerald has taken it in Chancery Lane, Oxford Street and Shoe Lane. It seems likely that the bats disturbed from St Paul's Cathedral in 1926 (Johnson 1930) were of this species.

Serotine. *Eptesicus serotinus* (Schreber).

This bat has a most remarkable distribution in the London Area, and indeed in England as a whole. Kent is its metropolis, and it may be seen hawking in many parts of the Kentish sector of the London Area from Sevenoaks (D. L. Harrison) and Westerham as far into the centre as Greenwich Park (B. Vesey-Fitzgerald). In the Surrey sector, however, there are only two certain records since 1900, one from Kenley in 1902 (skin in British Museum) and one seen in Richmond Park in 1936 (M. Blackmore). From Middlesex the only certain record is of one sent from Mill Hill to Vesey-Fitzgerald in 1936, and in Herts the locality of the only specimen, a male found in the porch of a house at Welwyn in 1937 (*Field*, 25.12.37, p. 1656) may have been just outside the Area. In Essex it again becomes more common, colonies being recorded from Great Parndon, Loughton and Ongar (G. Dent, 1943).

Noctule. *Nyctalus noctula* (Schreber).

Distributed throughout the London Area, though no certain records from Kent since 1920 (it appears to have been common before 1914). There are colonies in Hyde Park, Kensington Gardens and St James's Park, and M. Blackmore has seen as many as 50 flying together over the Serpentine or the Round Pond; these Inner London colonies were also known to Stubbs (1917), who watched them emerging from a hollow tree in Hyde Park, and to Millais (1904), who also recorded them from Regent's Park, Battersea Park and the grounds of the Bishop's Palace at Fulham. More recently, R. H. Ryall has seen large bats, presumably of this species, over Fulham Cross in 1944-45. The noctule occurs also at Wimbledon, Richmond Park, Bushy Park, Hampstead Heath and Epping Forest.

Long-eared Bat. *Plecotus auritus* (L.).

Before 1914 apparently common throughout the Area, but since then has become remarkably local, though often plentiful where found. One killed by a cat in Regent's Park in 1925 (Vesey-Fitzgerald) is the only recent Inner London record, though Webster (1911) said it was not uncommon in Regent's Park, Millais (1904) said it inhabited both St James's and Regent's Parks, and Webster (1902) said it bred regularly in a hollow oak in Greenwich Park. Since 1920 the only definite localities in the Area, mostly on the authority of Vesey-Fitzgerald, have been Godstone, Warlingham, Dulwich, Wimbledon, Richmond Park and Esher Common in Surrey, Moat Mount in Middlesex, Bushey Heath in Herts and Dagenham and Parndon in Essex.

Barbastelle. *Barbastella barbastellus* (Schreber).

One sent to Vesey-Fitzgerald from Acton, Middlesex, on September 3, 1939, is the only certain record since 1900. Millais (1904) records it from Chislehurst caves, but this was probably in the 19th century.

CARNIVORA.

Fox. *Vulpes vulpes crucigera* (Bechstein).

Still all too common in the rural and even in the outer suburban areas; neither hunting nor shooting seem able to keep down this bane of the poultry-keeper. As recently as 1939 a farmer at Hertingfordbury reported a lamb killed by a fox. There is no regular hunting within an area roughly defined by the scarp of the North Downs in Surrey, the Colne valley, Shenley to Cheshunt, Nazeing—Epping—Havering—Rainham. Even inside this area, however, there are plenty of foxes, for instance in Richmond Park, Wimbledon Common, Epping Forest and on the North Downs. Within quite recent years vixens have littered at Wallington, Surrey, Mill Hill, Middlesex, and in Ken Wood. Serious damage has been done to poultry in areas bordering on Hampstead Heath, and in 1939 a fox was said to be living in a hole near the Peter Pan statue in Kensington Gardens and attacking swans, geese, ducks and pigeons. Foxes occasionally seen in built-up areas, such as Brixton and Walthamstow are often put down as escapes, but in fact they have probably come in foraging from the outer areas. For instance the one shot in Greenwich Park in January 1947 after killing a goose had probably come from Shooters Hill, where foxes are still resident. Some idea of the numbers of foxes in the suburbs may be gauged from the fact that in one park only ten miles from London 120 were shot in seven years just before the war.

Badger. *Meles meles meles* (L.).

Much commoner around London, particularly on the North Downs in Surrey, and in Essex, than is usually supposed. On the North Downs occupied sets have been recorded in recent years at Farnborough and Eynsford, Kent, and Titsey, eight places in the Warlingham-Chelsham-Farleigh district, Selsdon, Banstead and Mickleham. Occupied sets have also been reported in Elmstead Woods and Sundridge Park, Kent, Nonsuch, Sandown and Richmond Parks, Surrey. The Nonsuch badgers were reported in the late 1920's. In 1937 five inhabited sets were known in Richmond Park, occupied by at least four pairs. North of the Thames there were occupied sets at Moat Mount, Middlesex, till 1933, at London Colney at the same time, and at South Mimms, Potters Bar, Hadley Wood and the Ridgway near Cuffley in 1922 (B. Vesey-Fitzgerald). In Essex there are occupied sets in Epping Forest (High Beach, Loughton Camp and possibly elsewhere), at Parndon, Ongar, Theydon Bois (two), Hainault Forest, Abridge, Havering-atte-Bower, South Weald, Grays, and Tilbury (G. Dent). Badgers frequently wander, and get run over by electric trains or otherwise come to grief in strange places, such as Ennismore Gardens, South Kensington, where one was found dead in May 1947. The present status of the famous set in Ken Wood is obscure. Johnson (1930) considered it had become deserted before 1925, but Miss K. Douglas-Smith reports that a badger was seen by the head keeper on two occasions in 1938. Badgers bred

in Kew Gardens in 1912-13, but so much damage to the waterfowl was attributed to them that the set was dug out and the only one found was transported to Essex.

Otter. *Lutra lutra* (L.).

Occurs on the Thames, Roding, Lea, Stort, Colne, Wey, Mole and some of their tributaries, but is no longer hunted in the London Area. On the Thames, the frequency with which they are seen between Hampton Court and Hammersmith strongly suggests that they breed somewhere on this stretch, possibly in the neighbourhood of Chiswick Eyot. Otters were seen, for instance, at Teddington in 1948, on the Longford River in Bushy Park in 1944, on Syon Marsh in 1937, and in several places on or near the Thames in 1921-23. On the Lea otters breed as near London as Walthamstow Reservoirs, where they are often seen by the staff. Like badgers, they occasionally wander and come to grief on electric lines or under the wheels of a car, and W. D. Melluish found one dead on the Ver at Moor Mill in January 1949. J. F. Burton saw one at a gravel-pit at Foot's Cray, Kent, in April 1949.

Stoat. *Mustela erminea stabilis* Barr-Ham.

Thinly distributed in the more rural parts of the Area, but extending towards the centre, where there are large open spaces. Recent records suggest that its inner limit is approximately Abbey Wood (1925) and Farnborough, Kent; Chelsham, Cheam, Wimbledon Common, Richmond Park, Surrey; Bushy Park, Mill Hill and Ken Wood, Middlesex; and Epping Forest, Essex.

Weasel. *Mustela nivalis nivalis* L.

Much the same status as the stoat. Inner ring of recent records from Shooters Hill and Elmstead Wood, Kent; Selsdon, Epsom, Wimbledon and Richmond Park, Surrey; Wembley, Mill Hill and Ken Wood, Middlesex; and Epping Forest, Essex.

Polecat. *Mustela putorius putorius* L.

One that was shot at Wimbledon in 1935 had undoubtedly escaped from captivity (G. Dollman).

Common Seal. *Phoca vitulina* L.

Occasionally strays up the Thames from the estuary, where it is said to breed on the remoter sand-banks. The four most recent came upstream as far as Chiswick Eyot in February and March 1942; an unspecified point in January 1928; Teddington (where it was fed daily for a week from Waite's Boathouse) in 1925; and Greenwich in 1911 (*The Times*, 17.2.42; Johnson 1930; Stubbs 1917). One captured in the Vale of Heath Pond on Hampstead Heath in August 1926 (*The Times*, 28.8.26) had presumably not got there unaided.

RODENTIA.

RABBIT. *Oryctolagus cuniculus* (L.).

An all too common pest of the outer parts of the Area, coming surprisingly far into the centre where open spaces permit. Inner limit of recent records: Abbey Wood (1925), Chislehurst, Hayes and Keston Commons, Kent; Selsdon, Nonsuch Park, Raynes Park, Wimbledon Common (over 200 occupied burrows in 1934), Richmond Park (about 100 pairs in 1936), and Kew Gardens, Surrey; Bushy Park, Hanwell (1925), Wembley, Mill Hill, Hampstead Heath and Ken Wood (at least up to 1938), Clapton (a few in Springfield Park till 1922, according to R. W. Pethen), Bromley gasworks (a strong colony in 1939, according to R. P. Donnelly); and Epping Forest, Wanstead and Beckton gasworks, Essex. The rabbits to be seen in the Dell, Hyde Park, and in Battersea Park a few years ago were semi-domesticated, or at any rate officially tolerated and encouraged. Webster (1902, 1911) stated that rabbits were abundant in Greenwich Park in 1901, and had been seen occasionally in Regent's Park up to 1910. The last wild one in Greenwich Park is said to have died in 1944 (J. F. Burton).

BROWN HARE. *Lepus europaeus occidentalis* de Winton.

Still common enough in the agricultural parts of the Area, having especially benefited from the increase of arable cultivation since 1939. It is hunted as near to London as Chessington, Surrey, and Radlett, Herts, and harried by " long dog men " all over the outer suburbs. Inner limit of recent records: Abbey Wood (1925), Addington, Cuddington, Wimbledon Common (now rare), Richmond Park (resident), Mill Hill, Epping Forest. As lately as 1911 it was stated to have been seen occasionally in recent years in Regent's Park.

DORMOUSE. *Muscardinus avellanarius* (L.).

The dormouse has perhaps the oddest distribution of all mammals to-day in the London Area. Though before the 1914 war it seems to have been locally distributed over the rural parts of the Area, with specific records from such places as Harrow, Ruislip, the Selborne Society's sanctuary near Perivale, and a wood within a few miles of the Crystal Palace, since 1920 its recorded occurrences have been almost exclusively confined to a small area in eastern Surrey. Beadell (1932) stated that it was frequent in the Warlingham-Chelsham district, e.g., at the Leas and Halliloo, specimens in the British Museum came from Whyteleafe in 1933 and Blechingley in 1944, and D. A. T. Morgan saw one on Limpsfield Common in June 1937. One seen in Knighton Wood in April 1943 by K. E. Hoy is the only recent record outside its Surrey headquarters. According to G. Dent the dormouse was common in the Epping district about 1910, but by 1939 he believed it to be extinct around Parndon, and in 1943 said he had not seen it for many years in the Epping district.

[Fat Dormouse. *Glis glis* L.].

Introduced at Tring in 1902, this animal has established itself in the neighbourhood of the town and for a few miles around, and appears to be spreading rather slowly. It has penetrated as far as Latimer within a mile of the London Area boundary, and should be looked for in the neighbourhood of Rickmansworth, Watford and St Albans, where it will probably turn up one day.

Bank-Vole. *Clethrionomys glareolus britannicus* (Miller).

Probably common throughout the Area, though there are few actual records. It was the commonest small mammal on Wimbledon Common when R. W. Hayman was trapping in 1928-29. Has also been trapped in recent years at Mill Hill, Limpsfield Common and near Leatherhead, and seen at Walthamstow Reservoirs, Ruislip, Great Parndon, Bookham Common and in the Sevenoaks district.

Water-Vole. *Arvicola amphibius amphibius* (L.).

Widely distributed on ponds and streams in the rural and suburban parts of the Area. Inner limit of recent records: Hogsmill river (Ewell, Tolworth), Beverley Brook (not since banks concreted some time 1930-37), R. Brent (Perivale, Brent Reservoir, Mill Hill), Hampstead Ponds (1940), R. Ching (Highams Park), R. Roding (Abridge to Buckhurst Hill). Webster (1911) said they were occasionally seen in Regent's Park.

Short-tailed Field Vole. *Microtus agrestis hirtus* (Bellamy).

Appears to be widely distributed and fairly common in most rural parts of the Area, though actual records are comparatively few. Inner limit of recent records: Wimbledon, Richmond Park, Mill Hill, Hampstead Garden Suburb (Bishop's Wood), Chingford (Gilwell Park), Walthamstow Reservoirs.

Musk-Rat. *Ondatra zibethica* (L.).

A male picked up dead on A.23 at Purley, Surrey, in April 1934 may have come from either the Wrecclesham (Surrey) or the Pulborough (Sussex) centre of introduction (Warwick 1934).

Long-tailed Field-Mouse. *Apodemus sylvaticus sylvaticus* (L.).

Widely distributed and commoner than the field-vole in the rural and suburban parts of the Area; appreciably more actual records. Inner limit of recent records: Abbey Wood (1925), Tooting Common (1929), New Malden, Wimbledon Common, Richmond Park, Neasden, Mill Hill, East Barnet, Chingford, Highams Park.

Yellow-necked Mouse. *Apodemus flavicollis wintoni* Barr-Ham.

Appears always to have been of very local distribution around London, and is certainly so to-day. Between 1900 and 1914 known only from Richmond Hill in 1904 and Kew (Dalgliesh 1908), Essex, where

Laver (*Zoologist*, 1915) stated it was found in most parts of the county, and Reigate, where Adams caught twenty-eight between 1904 and 1911 (Barrett-Hamilton and Hinton 1921). Millais (1904), however, said that de Winton had seen it on flower-borders at the Zoological Gardens, Regent's Park, presumably before 1900. Since 1920 the yellow-necked mouse has been reported from only two or three places in the London Area. In the Sevenoaks district one was trapped in a copse at the top of Riverhead Hill in January 1943, and it appears to be not uncommon (D. L. Harrison). A mouse trapped at Moat Mount, near Mill Hill, between 1933 and 1938 " showed a remarkable approximation to this species " (Dawson 1940). In Essex, G. Dent (*Essex Nat.*, 20: 89) records one which was caught in a cupboard at Ongar in 1921, and states that a few usually invade his house at Parndon in the autumn, when apples or nuts are stored in a room on the ground floor; one was trapped in 1941 and others were seen. It is interesting that though trapping has been carried out in the Area in recent years by Harrison at Sevenoaks, by Currie at Limpsfield, by Banfield at Leatherhead, by Hayman at Wimbledon and by Dawson at Mill Hill, the first- and last-named are the only ones to have secured any small rodent approximating to this species. Brown (1949) records one trapped indoors at Hertford Heath in November 1947.

Harvest-Mouse. *Micromys minutus soricinus* (Hermann).

The harvest-mouse appears to have faded out as a member of the fauna of the London Area just about the date when this paper starts, 1900. Beadell (1932), for instance, stated that it used to be abundant in cornfields and ricks in the Warlingham-Chelsham district of Surrey about 1892, but that he had not seen it " of late years." In Essex Laver (1903) said it had been frequent throughout the county " until the last three years," while G. Dent wrote in 1943 that nests were occasionally seen in the Loughton district about forty years before, but he had not seen or heard of any since. There is a somewhat vague statement by Fairall (1935) that harvest-mice were found throughout the Godstone district in 1935, but in view of the lack of supporting evidence, this record cannot be admitted. Other writers have suggested that the harvest-mouse still occurred, but very rarely, in various parts of the Area at various dates since 1900, but the only actual record is of one found dead in a swimming pool at Haileybury, Herts., in September 1947 (Brown, 1949). There is a single record of a harvest-mouse's nest being found on an allotment in Wimbledon " every autumn " (*Journal, Wimbledon N.H.S.*, April 1936), but in view of the lack of supporting identification details, and the extreme unlikelihood of the harvest-mouse surviving, otherwise unrecorded, so close to the centre of London, this record must be set aside.

Black Rat. *Rattus rattus* (L.).

Practically confined to the Port of London and its environs, where it outnumbers the brown rat, but occasionally strays a mile or two from

the river and its connecting canals and docks to such places at the Zoological Gardens in Regent's Park, Beckton Gasworks and a factory in Spitalfields, which became infested with them during the blitz, evidently after being driven from their normal haunts by bombs. A very variable species, by no means all individuals of which are black, the forms which have been given subspecific names as *R. r. alexandrinus* and *R. r. frugivorus*, but are in fact in Britain something more like colour phases, both occur in the Port.

Brown Rat. *Rattus norvegicus* (Erxleben).

A common and in some places abundant pest in all parts of the London Area, urban, suburban and rural. Watson (1944) has shown that the melanic form occurs in the Port of London (1.66 per cent. in a sample of 1266), and has been recently reported from widely scattered places within the county of London, so that it is probable that it occurs regularly in the whole London rat population. James Fisher informs me that the old record by de Winton of a black rat at the Regent's Park Zoo was in fact a melanic specimen of the brown rat.

House-Mouse. *Mus musculus* L.

An all too common pest in buildings of every description, from cold stores, where they breed at a temperature of 15° F., to sheds on suburban allotments, and occurs also out in the open a hundred yards or more from any building.

Banana Mouse. *Nyctomys sumichastri.*

A Central American species which not infrequently reaches the Port of London in banana cargoes (R. W. Hayman); the skin of one, received from the Port in 1934, is in the British Museum. The species has also occurred in banana cargoes at Swansea (Matheson 1947).

Coypu. *Myocastor coypus* (Molina).

In view of the large concentration of fur farms breeding this species near the confluence of the boundaries of Surrey, Hants and Berks, it is surprising that more coypus did not wander into the London Area, only fifteen or twenty miles away, in the years before the 1939 war. Since then the main source of wandering coypus must have been the feral colony established at Slough sewage farm, Bucks, only two or three miles beyond the boundary of the Area. Only three definite records are available: one at Cobham, Surrey, in 1937 (Laurie 1946), one at a gravel-pit at Horton, Bucks, in 1941 (Bureau of Animal Population), and one at the Isle of Wight Pond on Bookham Common in February 1946 (E. Cocks).

Red Squirrel. *Sciurus vulgaris* L.

The history of the red squirrel in the London Area from 1900 to 1938 was described in some detail in Fitter (1939). Since then an important

survey has been carried out by Shorten (1946) during 1944-45, which shows that at that date red squirrels had re-established themselves in an area on the North Downs in Surrey, including Banstead, Blechingley, Coulsdon, Chipstead, Chaldon, Gatton, Kingswood and Reigate. Odd specimens were also reported in 1944-45 from Northfleet and Sundridge in Kent. Also one at Elmstead Wood in 1942 (J. F. Burton), Surbiton and Weybridge in Surrey, Uxbridge in Middlesex and Radlett in Herts. The Epping Forest red squirrels seem to be slowly spreading over the woodlands around the Forest, though in 1948 (E. N. Buxton) they were very scarce in the forest itself. According to G. Dent (*Essex Nat.*, 26: 281; *in litt.*, 12.2.43), red squirrels recolonised the Parndon-Harlow-Ongar district after an absence of many years about 1936, but disappeared after 1947. In the Shorten survey in 1944-45, red squirrels also were shown to be present throughout East Anglia, except in south-east Essex, where in the London Area High Ongar and Great Warley were the only parishes east of the Roding from which they were reported. Further evidence has also come to hand in support of the theory that the reason why red squirrels survived in the London Area only in Epping Forest is that the late C. E. Green of Epping turned down a number obtained from the Continent in his garden about 1910, after the native stock had become virtually if not entirely extinct. Three definite and one possible *S. v. vulgaris* are available from the area, compared with only one definite *S. v. leucourus*. Of the *vulgaris*, two came from Epping Forest in 1936 (Fitter 1939) and 1939 (skin in British Museum) respectively, and the third from Hainault Forest in 1949 (skin in British Museum). Miss Frances Pitt informs me that though the red squirrel shot at Fanshaws, Hertford, late in 1946, after being seen regularly since May-June of that year (*Country Life*, 3.1.47) appeared to be the normal *S. v. leucourus*, one which was taken from a drey near South Mimms in the spring of 1946 and is now in the possession of Mrs Bennett of Tottenham is very suggestive of *S. v. vulgaris*.

Grey Squirrel. *Sciurus carolinensis* Gm.

The status of the grey squirrel in the London Area seems to be unchanged since its introduction and spread from six centres in the London Area (but mainly from Kingston Hill in 1902 and Regent's Park in 1905-07) was described by Fitter (1939). It is well distributed over the London Area, including the suburbs, in all fairly well-wooded districts, but appears to have become extinct in the Central Parks and is much harried in all public open spaces. It is still, however, occasionally seen in such places as Kew Gardens, Ken Wood and especially in Highgate Wood; for the complete survey of London open spaces, see Shorten (1946). In Greenwich Park, however, grey squirrels reappeared in 1946 (J. F. Burton). There is as yet no evidence that it has penetrated into Essex east of the river Roding except in the Ilford-Romford-Havering area (Shorten 1946).

UNGULATA.

Red Deer. *Cervus elaphus* L.

Does not occur in a wild state anywhere in the London Area, but herds are still maintained at large in Richmond and Bushy Parks, and in pens in several London parks, e.g., Battersea, Clissold, Golders Hill, Victoria. Up to at least 1905 there was a herd of 70 albino red deer in Langley Park, Bucks, the survivors of a larger herd of which all the naturally coloured specimens were killed off in 1887. Occasionally a carted deer will escape from hounds or one will jump over the fence of its enclosure, and remain at large for a few weeks or even years. For instance, a stag was shot near Leatherhead in 1947 (G. Johnstone).

Fallow Deer. *Dama dama* (L.).

There is still a wild herd of fallow deer in Epping Forest and the adjoining coverts; they are sometimes seen quite close to Chingford. In December 1948 the official count showed 182, of which 94 were probably outside the Forest (E. N. Buxton). Elsewhere, the fallow is purely a park deer in the London Area, being still kept in Lullingstone Park, Kent; Richmond Park, Surrey; Greenwich Park, London; and Hampton Court and Bushy Parks, Middlesex. Before the 1914 war, of course, there were many more deer parks around London containing both red and fallow deer, including Ashtead, Carshalton, Morden Hall and Wimbledon Parks, Surrey; and South Weald Park, Essex. As with the red deer, an occasional individual escapes; for instance, one frequented Gatton Park, Surrey, for several years during the 1930's. There are wild fallow at large in all the counties bordering the London Area, and these also may occasionally stray over the border.

Roe Deer. *Capreolus capreolus.*

Was reintroduced into Epping Forest in 1883, and by 1901 there were estimated to be at least 36 in the Forest and adjoining coverts. However, none have been reported from the Forest or its immediate environs since about 1923, when Lt.-Col. E. N. Buxton last saw one. A doe was seen at Lambourne, near Abridge, in 1920 (G. Dent). Two reported from near Epping in the summer of 1947 (D. G. Pelly per G. Dent) seem more likely to have been one of the aliens mentioned below. A doe was seen on "one of the more inaccessible slopes of Box Hill" (possibly just outside the area) in 1939 (S. Micklethwaite, *Field*, 1.7.39, p. 58) which suggests that the spread of the roe across southern England from Dorset has now reached the fringe of the London Area, and this deer should be looked for in woods on the North Downs in Kent and Surrey.

Other Deer.

Several other species of deer have established themselves in many woods in the South of England, and though they have not yet been reported from within the 20-mile radius from St Paul's, they should be

looked for, as a few may well have penetrated into some of the larger woods. They include the sika deer (*Sika nippon*), known to be at large in Kent, Surrey, Berks, Bucks, Herts and Essex, the Chinese water deer (*Hydropotes inermis*) which is in Berks and Bucks, the muntjac or barking deer (*Muntiacus muntjac*) which is in Berks, Bucks and Herts, and the Axis (*Axis axis*) in Berks, Bucks and Herts (Johnstone 1946).

CETACEA.

[Fin Whale. *Balaeonoptera physalus* (L.).]

Two seen between Albert Docks and Barking Creek on November 27, 1899, fail to qualify for inclusion in this paper by a margin of only five weeks (Baker 1908).

Narwhal. *Monodon monoceros* L.

A female stranded at Rainham, Essex, on February 17, 1949, was the fifth record for the British Isles (Fraser 1949).

Common Porpoise. *Phocaena phocaena* (L.).

Any small cetacean seen in the Thames—and at least one is seen almost annually—is usually reported as a porpoise, but the species can be included with certainty on the strength of one stranded at Waterloo Bridge in November 1936 (Fraser 1946). These small cetaceans reach surprisingly far up the Thames; Johnson (1930) records one at Hampton Court in September 1917, and a shoal in a backwater near Teddington Weir in February 1918.

Bottle-nosed Dolphin. *Tursiops truncatus* (Montagu).

One of the commonest cetaceans in the Thames. One came up as far as Hammersmith in May 1918 (Cetacea Report, 1918); off Battersea, where it was stranded at a wharf, it was seen to leap out of the river and catch two gulls (Johnson 1930). One was killed between Wandsworth and Battersea in June 1926 (Johnson 1930); one at Wandsworth Bridge in June 1928 (F. C. Fraser); a pair (male and female) at Strand-on-the-Green in July 1939; a cetacean in the Thames off Chiswick Eyot in April 1947 was also probably this species (C. Mott).

Common Dolphin. *Delphinus delphis* L.

The fact that more dolphins than porpoises have been properly authenticated in the Thames leads one to suppose that many of the small cetaceans loosely reported as porpoises have actually been referable to this species. One came ashore at Millwall in April 1937 and another at Putney in August 1935 (Fraser 1946). Two seen as far upstream as Chiswick on November 12-13, 1947 (F. C. Fraser) were probably the same as those seen between Westminster and Lambeth Bridges on the 29th of the same month (A. V. Tucker).

REPTILIA.

TESTUDINES.

[European Pond Tortoise. *Emys orbicularis* L.]

This tortoise has been introduced in two localities in Surrey outside our Area, at Shere in 1890-91 (H. Russell, *Zoologist*, 65: 238) and Frensham (Taylor 1948), and three tortoises probably referable to it were seen in the Surrey part of the Area in 1933-34: one in a gravel-pit at Beddington in April 1933 (R. S. R. Fitter), another in the Upper Pen Pond, Richmond Park, in July 1934 (A. Holte Macpherson), and the third in the Isle of Wight Pond on Bookham Common prior to 1935 (P. H. T. Hartley).

SQUAMATA.

Slow-worm. *Anguis fragilis* L.

Decidedly local in the London Area, especially north of the Thames; apparently most frequent on the North Downs in Surrey. Definite records since 1930 only from Eynsford, Hayes and Keston, Kent; Limpsfield, Godstone, Warlingham-Chelsham district, Ewell, Bookham and Leatherhead, Surrey; Mill Hill, Middlesex; Elstree and Hertford Heath, Herts.; Black Park, Bucks; and Epping Forest, Essex (uncommon). Before 1914 seems to have been more plentiful and widely distributed, though always rare in Herts.

Lizards ? sp.

There is some evidence of the presence in the Woldingham-Oxted-Godstone district of Surrey of unidentified lizards, some possibly the green lizard (*Lacerta viridis*), which has been introduced at Frensham on the other side of the county, others possibly the sand lizard (*Lacerta agilis*) in a relict locality on the East Surrey Greensand. The late R. W. Robbins and his son, the late Alan Robbins, each saw a strange lizard in an old chalk quarry at Oxted in different years about 1920. They were large, and seemed to have bright blue bellies. C. C. Fagg (*in litt.*, 11.2.49) states that he saw "some years ago" at Woldingham a large lizard that was eight inches long and bright yellow with black or dark brown. Neither the Oxted nor the Woldingham lizards, which in any case were on the Chalk, sound in the least like sand-lizards, which are mainly confined to sandy heaths in this country. Fairall (1935) states that several scouts claim to have seen both the sand lizard and the smooth snake (*Coronella austriaca*) at Godstone, and it is here that the possibility of a hitherto undetected relict colony of the two species on the Greensand arises. Dr Malcolm Smith informs me that the presence of green lizards at Godstone was reported to him during 1939-45, but he has been unable to procure a specimen. Another possible relict colony of sand-lizards has been reported from the railway embankment between Mitcham and Mitcham Junction Stations, Surrey, before 1920 (Maxwell Knight).

Common Lizard. *Lacerta vivipara* Jacquin.

Common and widely distributed on drier parts of the Area which remain unbuilt on. Inner limit of recent records: Abbey Wood, Greenwich Park (introduced 1946), Elmstead Wood, Streatham (not since 1935), Wimbledon Common, Stanmore, Elstree Reservoir, Scratch Wood, Epping Forest. Does not seem to have been noted on Hampstead Heath since 1912, nor in Kew Gardens since 1906.

Grass Snake. *Natrix natrix natrix* (L.).

Common and widely distributed, but somewhat patchy; abundant in some areas, such as S.W. Herts, and very scarce in others, such as the part of Essex north of Epping Forest. Inner limit of recent records: Abbey Wood, Shooters Hill, Elmstead Wood, Streatham (1926), Wimbledon Common (scarce), Highgate (1928), Golders Green (1927), Kingsbury (1932-33), Stanmore, Mill Hill, Hadley Woods (1927-28), Walthamstow Reservoirs, Epping Forest.

Viper or Adder. *Vipera berus berus* (L.).

Has become very rare north of the Thames, but still occurs in some numbers on the Chalk and Greensand in Kent and Surrey. No recent records nearer to London on the south side than Eynsford and Warlingham. Some which appeared in Battersea High Street about 1928 must have escaped from captivity (Johnson 1930). The only recent record for Herts or Middlesex is the statement by Dawson (1940) that it occurs rarely on the heath in Scratch Wood. In Epping Forest, where it was abundant at the turn of the century, it has become very scarce, but was seen in Monk Wood in 1936-38 (W. Steel). Mr A. Leutscher informs me that it still occurs in the drier parts of the Forest north of Loughton, and that he has reintroduced it in some parts in 1947-48. It is said still to occur at Tilbury Docks (J. Pavitt, *Listener*, 5.9.46). The copper-red variety has been recorded twice in the Area since 1900, at Oxshott in 1906 (J. C. Eales-White) and in Epping Forest in 1914 (G. Dent).

[Smooth Snake. *Coronella austriaca austriaca* Laurenti.]

The interesting possibility of the survival of a relict colony of this species and the sand lizard on the Greensand near Godstone has already been mentioned. Fairall (1935) states that it is " found amongst the heath " and that a specimen had been taken by W. Blackman. London herpetologists should strive to check this statement by taking another specimen which can be critically examined.

AMPHIBIA.

CAUDATA.

Common or Smooth Newt. *Triturus vulgaris vulgaris* (L.).

Occurs in most suitable ponds and pools, but rather local in some places. Inner limit of recent records: Abbey Wood (1925), Streatham, Croydon, Wimbledon Common, Richmond Park, Hounslow, Wembley, Mill Hill, Epping Forest.

Palmate Newt. *Triturus helveticus helveticus* (Razoumowsky).

Has a remarkably local distribution, though probably overlooked in several other places. Since 1920 recorded in the London Area only from the Nore Hill dewpond, Warlingham (Beadell 1932) and Bookham Common (very numerous in Bayfield Pond, some also in Isle of Wight Pond; A. L. Panchen, 1945), both in Surrey; and from certain ponds, including bomb craters in Epping Forest (A. Leutscher). It is known also from one other Surrey locality just across our border (Ranmore Common, 1936-38, S. Leatherdale), and from the Berkhamsted district, where it is said to be common (Lloyd 1947). It was taken at Tooting in 1902.

Crested Newt. *Triturus palustris palustris* (L.).

Widely distributed, but less common than the smooth newt. Few actual records since 1920; known localities include Warlingham-Chelsham district, Sanderstead, Godstone, Streatham district (1926), Wimbledon (1930), Bookham Common, Surrey; Wembley, Middlesex; and Epping Forest, Essex. Lloyd (1947) states it is not uncommon, and widely distributed, in Herts, but cites no localities.

SALIENTIA.

Common Frog. *Rana temporaria temporaria* L.

Common and widely distributed, even in the suburbs. Inner limit of recent records: Abbey Wood (1925), Lewisham, Streatham, Wimbledon Common, Richmond Park, Neasden, Golders Green, Hampstead and Highgate district (Hampstead Heath, Parliament Hill Fields, Highgate Ponds, Fitzroy Park), Walthamstow Reservoirs.

Edible Frog. *Rana esculenta* L.

Has appeared in several places in the London Area, doubtless having spread from various points of introduction in south-east England. Ham Common and gravel-pits and Richmond Park have been well-known localities for some years, and both colour-phases occur at gravel-pits at Dunton Green, near Sevenoaks (R. I. Douglas, D. L. Harrison). One was caught on Bookham Common in 1936 (C. P. Castell, J. L. Harrison), but it has not established itself there. Hampstead Heath, a substantial population located in Highgate No. 1 Pond in late May 1948, probably totalling over 200; adults seen and tadpoles taken from Viaduct Pond, July 1948; also heard on Highgate No. 2 Pond and reported from Leg of Mutton Pond (J. Hillaby). This suggests that the attempt of members of the British Herpetological Society to introduce edible frogs on Hampstead Heath by releasing five caught at Ham gravel pits in two ponds on Golders Hill in late June or early July 1948 (S. Rata) was a case of carrying coals to Newcastle. Wanstead, a colony found in Whipps Cross Ponds in 1948 had probably been there for at least four years (A. Leutscher).

Marsh Frog. *Rana ridibunda.*

Wanstead Park, Essex, some enlarged by A. Leutscher in 1948.

Common Toad. *Bufo bufo bufo* (L.).

Status almost identical with that of common frog, but not seen at Streatham since 1922.

Natterjack Toad. *Bufo calamita* Laurenti.

All records for the Area are old, vague or unsatisfactory. Known from Cobham and Wisley Heath in 1902 (Boulenger 1902); last seen at Streatham in 1902, and formerly common on Tooting Common (S. T. E. Dark); at Wimbledon said to be no longer present in 1912 (Johnson 1912), but Harrison (1935) said it was well known until " recent years "; still said to be found in the Hampstead district in 1913 (Findon 1913); possibly present in the Great Hollow on Oxshott Heath in 1926 (Richards 1926). Fairall (1935) states that it occasionally appears at Godstone, takes possession of the Rectory Pond, and a year or so later disappears again.

REFERENCES.

A full bibliography of the mammals, reptiles, and Amphibia of the London Area was published in the *London Naturalist* for 1947 (Fitter 1948), and it is not considered necessary to repeat the references given there. Brown (1949), Fairall (1935) and Tucker (1948) are the only fresh references falling within the scope of the bibliography which have come to hand since its publication. The following list contains all references used in the present paper which are not cited in the above-mentioned bibliography.

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Plant Gall Records for 1948.

By H. J. Burkill, M.A., F.R.G.S.

THE past year can hardly be said to have been an outstanding one, but there were several interesting features, some of which are listed below. A paper by Mr M. Niblett on his observations on plant galls in Surrey in 1948 appears on page 117.

Cynipidae:—In 1947 *Cynips quercus-folii* L. was abundant but many of the galls I cut open were parasitized with the result that the alternate form *taschenbergi* Schl. was very scarce in the spring and *folii* was almost entirely absent in the autumn, the parasite having done its work only too well. A similar state was noticed with *C. longiventris* Htg.

I failed to get results from sleeved *Andricus circulans* Mayr on *Quercus cerris* L., and from *Rhodites mayri* Schl. on *Rosa canina* L.

I found the last named insect doing well in a Surrey locality, while *Xestophanes brevitarsis* Thoms. was plentiful on Bookham Common and *X. potentillae* Retz. was abundant at Fetcham. *Liposthenus latreillei* Kieff. was plentiful in the spring at Fetcham but absent in the autumn. *Isocolus rogenhoferi* Foerster was not found though searched for frequently. In Riccal Dale, Yorkshire, all the galls of *Neuroterus baccarum* L. that I found were on the flower catkins and not on the leaves which seems to point to a discrimination on the part of the fly when ovipositing.

Several good clusters of *Andricus sieboldi* Htg. were noted when the Plant Galls section went to Oxshott.

Cecidomyiidae:—Many of the usual species were not to be seen, especially those that attack the Umbelliferae seeds. Galls of *Contarinia solani* Ruebs. were noted on one of the banks in Sutton station, an example of the powers of flight of some of these small insects as it seems hardly likely that other bushes of the host plant *Solanum dulcamara* L. would be growing close to.

Trypetidae:—Not up to the usual numbers, but I found *Urophora jaceana* Hering on *Centaurea nigra* L. to be plentiful in most localities after several years of scarcity.

Eriophyiidae:—In view of R. Gurney's article in the *North Western Naturalist*, xxi, 3 and 4, on Witches' Brooms on Willows, considerable attention was paid to the sex of the trees suffering from this infestation. All the *Salix fragilis* L. that I was able to examine and which were attacked by the gall proved to be female trees as he stated, but three *S. vitellina* L. were male. A number of *fragilis* were examined at Thirsk, Yorkshire, and all attacked trees were female. The galls were very conspicuous on *fragilis* alongside the railway line from Doncaster to York, but of course no sex determination could be made from the train. The mites which have been known to the L.N.H.S. members for years were seen on some of the *fragilis* galls, obtained in Surrey.

Eriophyes kerneri Nal. on *Gentiana campestris* L. has nearly been exterminated in one of its chief localities on the North Downs owing to

the defence works carried out during the war. *E. cladophthirus* on *Solanum dulcamara* L. has died out in Leatherhead where it was conspicuous for over one hundred yards along a hedge, but a fresh colony appeared near Effingham Station malforming the plants to an extraordinary degree. This spot has been under observation for many years without any sign of the presence of the mites.

Nematoda:—At Gormire Lake in Yorkshire Miss C. M. Rob discovered some small galls on the young leaves of *Prunella vulgaris* L. and handed them to me for investigation. When I reached home some weeks later I was able to put the material under the microscope and found a number of living Eelworms, which are apparently a fresh record and as such require further investigation. *Tylenchus millefolii* F. Low, on *Achillea millefolium* L. was found in quantities on Ranmore Common, Surrey, where it had not been detected for some twenty years, having been wiped out in a bush fire.

Dr W. A. Sledge of Leeds sent me some *Silene inflata* Sm. with intensive proliferation of the flowers, the petals being distorted into narrow filaments. I failed to discover the causers.

Plant Galls in Surrey, 1948.

By M. Niblett, F.R.E.S.

DURING 1948 seventy-nine visits were made to twenty-seven different localities in search of plant galls. The results obtained were often poor, but a number of interesting and satisfactory records were made, a summary of which is given below.

Cynipidae:—An insect, gall, and alternating generation, new to science. *Cynips disticha* Hart. a.g. form *indistincta* Niblett s.g. The galls were on *Quercus sessiliflora* Salisb. in two situations a mile apart. The connection was confirmed by obtaining *indistincta* galls from sleeved *disticha* flies. Both insect and gall are scarcely distinguishable from *C. divisa* Hart. form *verrucosa* Schlchtd. (Niblett, 1948, *Proc. R. Ent. Soc. Lond.*, (A) 17, pp. 142-144).

Rhodites centifoliae Hart. Not previously recorded for Britain; on an unrecorded host-plant, *Rosa spinosissima* L. This is a smooth pea gall.

Rhodites rosae L. and *Rhodites* pea galls, generally not very plentiful.

Rhodites spinosissimae Gir. On both *Rosa canina* L. and *R. rubiginosa* L.

Rhodites mayri Schlchtd. In small numbers in several localities, including two new ones.

Xestophanes brevitarsis Thoms. Fairly plentiful. *X. potentillae* Vill. none seen.

Aylax pavaveris Per. On *Papaver rhoeas* L., scarce. One new locality.

Liposthenus latreillei Kieff. In fair numbers in several localities.

Isocolus jaceae Schenck. On *Centaurea nigra* L., in a new locality.

Phanacis centaureae Foerst. Fairly plentiful. On *Centaurea nigra* in a new locality.

Aulacidea hieracii Bouché, on *Hieracium umbellatum* L., *A. hypochoeridis* Kieff, on *Hypochoeris radicata* L., and *A. tragoponis* Thoms, rather scarce.

Cynips (*Diplolepis*) galls generally scarce except *C. disticha* Hart. This was expected, owing to the hundreds of these galls found in 1947 inhabited by the larvae of Chalcid or inquiline larvae.

Neuroterus tricolor Hart. and f. *fumipennis* Hart. In small numbers but well distributed, on both oaks. *N. aprilinus* Gir. Fairly plentiful on both oaks. *N. schlechtendali* Mayr. Fairly plentiful on both oaks in many localities, some galls on catkins thirty feet from the ground.

Andricus corticis L., *A. ramuli* L., *A. callidoma* Hart. f. *cirratus* Adl., *A. nudus* Adl. f. *malpighii* Adl., *A. seminationis* Adl., *A. quadrilineatus* Hart., *A. albopunctata* Schlchtd., *A. solitarius* Fonc. and f. *occultus* Tscheck, all seen in small numbers on *Q. robur* L.

Andricus glandulae Schenck and f. *xanthopsis* Schlchtd. on *Q. sessiliflora*. *A. fecundator* Hart. and f. *pilosus* Adl., *A. curvator* Hart. f. *collaris* Hart., *A. inflator* Hart. f. *globuli* Hart., *A. ostreus* Gir. and f. *furunculus* Bey.: all seen in fair numbers on both oaks. *A. radicis* Fab.—about twenty galls in one cluster were seen in the spring, all had been destroyed by birds or mice by the autumn.

Trigonaspis megaptera Panz. and f. *renum* Gir. found in small numbers in several localities.

Andricus circulans Mayr. on *Q. cerris* L., fairly plentiful in a number of localities.

Cecidomyidae:—Midge galls with certain exceptions were generally rather scarce, many of the quite common species were noticeably so. *Dasyneura bryoniae* Bouché on *Bryonia dioica* L.; *D. aparines* Kieff. on *Galium aparine* L.; and *Contarinia solani* Rübs. on *Solanum dulcamara* L. were seen in greater numbers and more widely distributed than ever before.

Galls of *Dasyneura polygoni* Rübs. on *Polygonum amphibium* L. were found at Epsom. This species is a new record for Britain. The gall is similar to that of *Wachtliella persicariae* L., but the larvae are pale yellowish-red and leave the galls to pupate in the earth.

Contarinia sp. Folded leaves of *Hypericum perforatum* L. with yellow jumping larvae in them. I can find no reference to a *Contarinia* galling *Hypericum*. Other galls seen were: On *Achillea ptarmica* L., *Rhopalomyia ptarmicae* Vallot.; on *A. millefolium* L., *R. millefolii* H. Lw.; on *Betula pubescens* Ehrh., *Plemeliella betulicola* Kieff. and *Anisostephus betulinum* Kieff.; on *Carpinus betulus* L., *Zygiobia carpini* F. Lw.; on *Centaurea scabiosa* L., *Loewiola centaureae* F. Lw.; on *Cornus sanguinea* L., *Craneobia corni* Gir.; on *Crataegus monogyna* Jacq., *Dasyneura oxyacanthae* Rübs., *D. crataegi* Winn.; on *Daucus*

carota L., *Lasioptera carophila* F. Lw., *Kiefferia pimpinellae* F. Lw.; on *Epilobium angustifolium* L., *Dasyneura epilobii* F. Lw. and *D. kiefferiana* Rübs.; on *Fagus sylvatica* L., *Hartigiola annulipes* Hart.; on *Fraxinus excelsior* L., *Dasyneura acrophila* Winn., *D. fraxinea* Kieff. and *D. fraxini* Kieff.; on *Galium palustre* L., *Geocrypta galii* H. Lw.; on *G. mollugo* L., *Schizomyia galiorum* Kieff.; on *Helianthemum chamaecistus* Mill., *Contarinia helianthemi* Hardy.; on *Hypericum perforatum* L., *Dasyneura hyperici* Br.; on *Lamium galeobdolon* Cr., *Dasyneura galeobdolontis* Winn.; on *Lathyrus pratensis* L., *Dasyneura lathyri* Kieff.; on *Linaria vulgaris* Mill., *Diodaulus linariae* Winn.; on *Lotus corniculatus* L. and *L. uliginosus* Schk., *Contarinia loti* Deg.; on *Persicaria amphibium* L., *Wachtliella persicariae* L.; on *Populus tremula* L., *Harmandia globuli* Rübs., *H. populi* Rübs., *H. tremulae* Winn., *Dasyneura populeti* Rübs., *Lasioptera populnea* Wachtl. and *Syndiplosis petioli* Kieff.; on *Pteris filicina* L., *Dasyneura filicina* Kieff.; on *Quercus robur* L., *Macrodiplosis dryobia* F. Lw. and *M. volvens* Kieff.; on *Rosa canina* L., *Wachtliella rosarum* Hardy.; on *Rubus fruticosus* L., *Dasyneura plicatrix* H. Lw.; on *Sambucus nigra* L., *Placochela nigripes* F. Lw.; on *Scrophularia nodosa* L., *Contarinia scrophulariae* Kieff.; on *Senecio jacobaea* L., *Contarinia jacobaeae* H. Lw.; on *Silaus flavescens* Bernh., *Kiefferia pimpinellae* F. Lw.; on *Sonchus arvensis* L., *Cystiphora sonchi* F. Lw.; on *Spiraea ulmaria* L., *Dasyneura pustulans* Rübs. and *D. ulmariae* Br.; on *Stachys sylvatica* L., *Wachtliella stachydis* Br.; on *Tamus communis* L., *Schizomyia tami* Kieff.; on *Tanacetum vulgare* L., *Rhopalomyia tanaceticola* Karsch.; on *Tilia europaea* L., *Dasyneura tiliamvolvens* Rübs. and *Contarinia tiliarum* Kieff.; on *Taxus baccata* L., *Taxomyia taxi* Inch.; on *Tragopogon pratensis* L., *Contarinia tragoponis* Kieff.; on *Trifolium repens* L. and *pratense* L., *Dasyneura trifolii* F. Lw.; on *Ulmus glabra* Mill., *Janetiella lemeei* Kieff.; on *Urtica dioica* L., *Dasyneura urticae* Per.; on *Veronica chamaedrys* L., *Jaapiella veronicae* Vallot.; on *Viburnum lantana* L., *Phlyctidobia solmsi* Kieff. and *Contarinia lonicerearum* F. Lw.; on *Vicia cracca* L., *Anabremia viciae* Kieff., *Dasyneura spadicea* Rübs. and *D. loewiana* Rübs.; on *Vicia sepium* L., *D. viciae* Kieff. and *D. spadicea* Rübs.; on *Vicia tetrasperma* Moench., *D. loewiana* Rübs.

Trypetidae:—Few Trypetid galls were seen, these include:

On *Cnicus arvensis* Hoffm., *Urophora cardui* L. The general scarcity of these galls was very noticeable after their abundance in the previous year. *U. jaceana* Her. on *Centaurea nigra* L. was well distributed in fair numbers. A small number of galls of *U. stylata* F. on *Cnicus lanceolatus* Willd. were seen. *Myopites blotii* Breb. on *Pulicaria dysenterica* Gray and *Noeeta pupillata* Fall. were also found.

Eriophyidae:—Observations on Mite galls were not carried out very intensively; the following were seen:

On *Artemisia vulgaris* L., *Eriophyes artemisiae* Can. was found in two new localities; on *Betula pubescens* Ehrh., *E. rudis longisetosus* Nal.; on *Centaurea scabiosa* L., *E. centaureae* Nal.; on *Crataegus monogyna* Jacq., *E. crataegi* Can. and *E. goniothorax* Nal.; on *Enony-*

mus europaeus L., *E. convolvens* Nal; on *Galium aparine* L., *mollugo* L., *palustre* L., and *verum* L., *E. galii* Karp.; on *verum*, *E. galiobius* Can.; on *saxatile* L., *Phyllocoptes anthobius* Nal.; on *Origanum vulgare* L., *Eriophyes origani* Nal.; on *Poterium sanguisorba* L., *E. sanguisorbae* Can.; on *Prunus spinosa* L., *E. similis* Nal.; on *Sambucus nigra* L., *Epitrimerus trilobius* Nal.; on *Thymus serpyllum* L., *Eriophyes thomasi* Nal.; *on tilia europaea* L., *E. tiliae exilis*, *E. tiliae liosoma* Nal. and *E. tiliae typicus* Nal.; on *Ulmus sativa* Mill., *E. ulmi* Nal.; on *Viburnum lantana* L., *E. viburni* Nal.; on *Vicia tetrasperma* Moench., *E. plicator trifolii* Nal.

Fungi:—On *Ficaria verna* Huds., *Uromyces ficariae* Schum.; on *Galium mollugo* L. and *G. palustre* L., *Puccinia galii* Pers.; on *Populus tremula* L., *Taphrinia aurea* Fries.; on *Rhamnus catharticus* L., *Puccinia coronifera* Kleb.; on *Rubus fruticosus* L., *Coniothyrium tumifaciens* Güss.; on *Tragopogon pratensis* L., *Ustilago tragoponis* Wint.; on *Viola* sp., *Urocystis violae* Sw.

Book Reviews.

Moths and Memories. By P. B. M. Allan. (Watkins & Doncaster).

THE appearance of a new volume from the pen of an "Old Moth-Hunter" will be hailed with delight by the Field Lepidopterist. The author declares in his Preface that ". . . as *belles lettres* the books about our pursuit cut a poor figure . . . "; and this new volume is a bid to improve the position. It may be conceded at once that he does not miss the target. Admittedly several chapters are of quite a light character, chiefly remarkable as revealing the wide knowledge and *bonhomie* of a many-sided man of the world, his keen sense of humour, and his flair for unmasking humbug; but even from these he cannot exclude glimpses of his phenomenal knowledge of the living moth in the wild, or of his own skill in rearing its progeny. For before all else he is a Field Naturalist, and, once he is set on the woodland trail, you may hear him laugh both at the obscurantism of the specialist in technicality, and the pathological fecundity of the inventor of aberrational names. He writes, indeed, with the same background of field-knowledge, and, withal, the same light-heartedness, as did E. H. Aitken ("E.H.A.") who penned those engaging sketches of Indian wild life some two generations ago.

Two chapters, in more serious vein, deal with the disappearance from Britain of our indigenous *Aporia crataegi* (Black-veined White), and the establishment here of *Callimorpha hera* (Jersey Tiger Moth). The former is ascribed mainly to climatic changes, and the latter—most surprisingly—to "planting" at the instance of the Rev. F. O. Morris!

Altogether, a delightful book—a book to revive in us who are no longer young the intense joy and enthusiasm with which we took the field in our 'teens.

J. A. S.

Sea-shore Life of Britain. By L. R. Brightwell. London: B. T. Batsford, 1947. 12/6. (The British Nature Library, pp. 116, 4 col. pls., 94 photographs and drawings).

Our member, Mr Brightwell, is to be congratulated on producing such an attractive and readable account of the lives of some of the commoner sea-side creatures. The author is his own artist and his delightful plates, four of which are in colour, add greatly to the attraction and value of this little book. The photographs are well chosen and all the plates are well produced, but some of the text-figures are rather crude (those of "Common Snails of the Sand Dunes" especially so). Each chapter deals with one type of habitat such as "The Sands—Low Tide," "The Inshore Rocks," "The Half-Tide Rocks."

The beginner will be carried along by Mr Brightwell's enthusiasm and will doubtless wish, not only to study sea-shore life on the spot, but to read up the subject. His needs are satisfied to some extent by "A List of Useful Reference Books," most of which are monographs and standard works which will enable him to identify marine animals. It is unfortunate that room could not have been found for the titles of some of the more general popular or recent works on the sea-shore such as:—Furneaux' *The Sea Shore*; Newbiggin's *Life of the Sea Shore*; Wilson's *Life of the Shore and Shallow Sea*; Russell and Yonge's *The Seas*; Eale's *The Littoral Fauna of Great Britain*; and Flatterley and Walton's *Biology of the Sea Shore.*

The reader who wishes to pursue the subject further will find the absence of scientific names a handicap, and it is to be hoped that the author will at least provide an appendix of scientific names for the plants and animals he mentions. A few are introduced in the text, but there are many irritating mis-spellings, both in the text and in the index. However, these are minor defects which will be rectified, no doubt, in the next edition, and we have no hesitation in recommending every London naturalist to read this book before and during his next sea-side holiday.

C. P. C.

The Badger. By E. Neal, M.Sc. New Naturalist Monograph. Collins, London, 1948. Pp. xv, 158, 30 photographs (1 col.), 12 maps and diagrams. 8vo. 12/6 net.

Among the few large and comparatively common mammals these islands possess the badger is perhaps the least known. Its nocturnal habits, keen senses, retiring disposition, inoffensive ways and the comparative security of its deep burrows or sets, all help it to live without attracting too much attention from its only enemy, man.

In this book Mr Neal not only brings together and reviews all the available information on the past and present distribution and life history of the badger: to a very great extent he enlarges our knowledge of most of the aspects of badger biology and ecology by means of a remarkable series of observations, undertaken over a period of years by himself and a small team of helpers, on a particular badger colony in Somerset. The results of this work make the book of particular interest and importance.

In a short review it is only possible to indicate a few points of special interest. The chapter on badger-watching methods, for instance, explains the technique of acquiring information on badger numbers, movements, range, etc. In the chapters on such subjects as food habits, alleged hibernation, and reproduction, the author has much to say that is new and at the same time authoritative, based on observation allied to recent research. The badger's food habits are shown so clearly to be in general harmless or beneficial to agriculture that the senseless persecution to which this animal is still subjected only too often can only be attributed to ignorance and prejudice. This book should do much to dispel that ignorance.

The only criticisms I have to make are on two minor points, which I understand will be corrected in the next edition. On p. 14 an erroneous statement of Mortimer Batten's as to an alleged sexual difference in the arrangement of the canine teeth is repeated, and on p. 18 the ferret-badgers of the Far East are said to be arboreal. Actually, although on occasion they climb well, these distant relatives of our badger are mainly terrestrial and burrowing in habit, like the rest of the Melinae.

In conclusion, it can be said that this volume is a first class piece of work and sets a high standard for others to follow in this series. The excellent photographs add greatly to the attractiveness of the book.

R. W. H.

The New Naturalist. Editor, James Fisher. 1948. London: Collins, 21/-.

Once again James Fisher has given his fellow members of the Society, and all naturalists, a fine instructive volume. This time it is as editor of, we are informed, the first volume of a new journal which is designed to appear eventually as a quarterly. The four quarters of the present volume are devoted to Woodlands, the Western Isles of Scotland, Migration and the Local Naturalist. The authors include many of the best known naturalists of our country and the chapters are representative of their wide interests. A. G. Tansley's British Woodlands is a fine introduction, richly illustrated. In fact, with its list of reference books, it is typical of the general layout of the articles which include thought-provoking contributions on the birds and butterflies, etc., of the woodlands. Of the portion dealing with the Scottish Isles, Fisher's own chapter on St Kilda is outstanding.

These two quarters are probably typical of what may be expected in future numbers of the new journal: informative matter, pleasantly written, but embodying many suggestions for further enquiry, beautifully illustrated in colour and in black and white, with underlying the whole, as bed-rock, the ecological point of view.

Although most of the pages devoted to migration concern birds, and are expertly dealt with by A. Landsborough Thompson, R. M. Lockley, Peter Scott and others, butterflies and other animals are included. But perhaps to many some of the most interesting items in the present volume are the contributions gathered together in the section for Local Naturalists. H. K. Airey Shaw's valuable list of the Natural History

Societies in this country is most impressive. All are now able to get into touch with others of similar interests living in their neighbourhood or at least county or in areas it is proposed to visit. David Stainer shows the improved outlook exhibited at the School Natural History Societies. It is to be hoped that as pupils leave they will be encouraged to join the local societies and continue their contributions to natural history. The only adverse criticism offered is that the excellent production renders the work too expensive for circulation amongst the younger naturalists to the extent the contents justify. Perhaps the advent of the cheaper quarterly numbers will correct this.

L. P.

British Plant Life. W. B. Turrill, D.Sc., F.L.S. Pp. xvii + 315 + 72 plates. London and Glasgow: Wm. Collins, Sons & Co. Ltd. 1948. 21/- nett.

This volume is number ten of the now well-known "New Naturalist Series" and is written by an acknowledged expert in the subject, Dr W. B. Turrill, Keeper of the Kew Herbarium.

Until about 30 years ago students of the British flora had confined their attention to the enumeration, description, and distribution of species. The study of palæobotany, cytology, genetics, and ecology has broadened the outlook and is beginning to show how one species has developed into another and also the relationships between plants and their environment.

The second chapter of this book is, as the author states, largely speculative in that it deals with the origin of living organisms. This is followed by an outline of our knowledge of the changes in the vegetation of the earth through the ages, as shown by the study of fossil plants. It is interesting to note that of the estimated number of species occurring in the British Isles, 13,410, 1509 are seed bearing, and of these 1092 are dicotyledons and 417 are monocotyledons. The various factors affecting British plants are dealt with under the heads of climate, soil, the action of animals and of plants themselves.

In thirty-five pages the author discusses the development of and modifications in ten types of plant community. The following chapter describes variations in a large number of species, and the student should receive encouragement here to observe and record any variants met with during his field work. The subject of heredity as applied to British plants is admirably treated by means of a well chosen series of monographs on species which have received special study and to which genetical and cytological methods have been applied.

The concluding chapters show clearly that our flora is by no means static but is changing continually, and the reader is exhorted to keep accurate records in an effort to widen our knowledge of any changes occurring within species and also in vegetation generally. The appendices include a set of distribution maps, outlines of taxonomic and ecological methods, biometrics, cytology, and genetics as well as a good bibliography and glossary, which latter will be found extremely useful in reading the book.

The illustrations, which are contributed by such well known nature photographers as F. Ballard, Eric Hosking, John Markham, Brian Perkins and others, are particularly fine, especially those in colour. The publishers are to be congratulated on the excellence of the reproduction and colour rendering. The book, although obviously intended for the serious student of Botany, is worthy of the attention of the general reader provided that he is prepared to master the technical terms which are inseparable from a work of this type. G. R. A. S.

Obituary.

Laurence Gilbert Payne.

It was with shock and disappointed hopes that members heard of the death of Laurence Gilbert Payne, the Society's President for the three years 1946-1948. A sudden dangerous illness had necessitated his removal to hospital where he had made an unexpected but very hopeful recovery. This, however, proved all too short and he succumbed on 10th March 1949.

Payne was born at Salford on 8th December 1893. The family moved to Balham in 1906, and from this time he began to evince a love of Nature and its wild creatures which was fostered in outings with his brother, Mr E. M. Payne, who is also a member of our Society.

He entered the Westminster Bank in 1911 and served in the Great War until being seriously wounded on the Somme in 1916.

He was introduced to the Society in 1923 by the late E. B. Bishop, a former President, and his sister, the late Mrs C. L. Wilde, whom he met while on a holiday with his wife in Dorset. His enthusiasm for natural history soon showed itself, and he early gave great stimulus to the Botanical Section. From 1925 his Field Meetings—usually for one or more particular species—were almost annual events. His careful observations have added much to the Society's botanical records and he also contributed some very useful notes for C. E. Salmon's *Flora of Surrey*. Well versed in most of the Natural Orders, he gave perhaps most attention to the Orchids and to Ferns, on both of which he had read papers to the Society.

While retaining his keen interest in plants, Payne had latterly devoted much attention to Reptiles and Amphibians, and still later to Insects, particularly the Beetles, of which he was, with his son Ronald, bringing together an interesting and valuable collection.

Although a careful student of the critical structure leading to the identification and classification of both Plants and Beetles, Payne always had a keen love of his subjects as living organisms, and enjoyed observing their life histories no less than their structure and distribution. His model was always Fabre—to quote from his Presidential Address, 1946—" . . . . . he (Jean Henri Fabre) has been, and remains, the biggest single influence and inspiration in my personal humble natural history life."

The love of the living plant or animal was markedly shown by his skill as a gardener and as a keeper of vivaria of several types. No one who had met him in his very happy home circle at Richmond will forget his rock garden, with each plant in conditions as near to nature as circumstances would allow, and his delight in showing such things as *Cyprepedium calceolus* from the Swiss Alps, flowering in profusion year after year. Nor will one forget his ingenious arrangements for ponds, with water plants and aquatic life of many types. And then "Toad Hall," with its population of reptiles and batrachians from many countries, living in what were evidently ideal conditions with electric light and "every modern convenience" for both observer and observed.

Payne's experience in natural history was enriched by visits to Switzerland, Belgium and France as well as many parts of Britain, always in enthusiastic pursuit of his favourite studies, an enthusiasm and interest happily shared by his family. His plans for 1949 had included visits to such famous localities as Ben Lawers and Wicken Fen, the latter in company with the present writer.

Besides our Society, which always held his main loyalty, Payne had been a member of the Richmond and District Aquarists' Society, and until the recent war had been a frequent contributor to *Water Life*. He was also a Fellow of the Zoological Society, a member of the South London Botanical Institute, the newly-formed Herpetological Society, and the South London Entomological and Natural History Society. His constant friendliness did much to foster the cordial relations between that Society and our own.

His contributions to the *London Naturalist* included three papers on Ferns, one on the Natterjack Toad, and one on the Coleoptera of Bookham Common, as part of the Ecological Section's Survey of that area. His Presidential Addresses—Lives of Six Naturalists (1946) and The Story of our Society (1947 and 1948)—have all been printed in our Journal. The Story of the Society (in two parts) apart from its intrinsic interest, will serve as a standard reference and be of great value to the older members as well as to newcomers.

Payne's work for the London Natural History Society was given with that energy and unselfish devotion which characterised all his doings. He had held many offices and was Chairman of the Botanical Section from 1938 to 1945 and of the Ecological Section from 1943 to 1945. As the Society's Curator from 1938 to 1945 he was the leader of those stalwarts who gave exacting hours to the care of the Society's possessions on the outbreak of war.

His loss will be particularly felt by the Ecological Section. From the start of the survey at Bookham Common in 1941 until long after he took up his duties as President, he was a constant, popular and inspiring figure at the monthly meetings. Here, doubtless, he found the best outlet the Society could offer him for his keen powers of careful and thoughtful observation. Here, too, at lunch and at tea time he enjoyed passing round his finds and discussing them and other natural history

problems. By his example, he contributed in no small way towards the success of the Section's war-time venture.

His Presidency covered three years following the war, years of great activity and expansion in the Society's membership and scope. It involved much personal attention and the taking of responsibility, where his business acumen and organising ability stood the Society in good stead, and enabled him to make quick decisions when clear thinking and prompt action were essential—and all at a time when his own business responsibilities were very considerable.

Payne's frank and generous nature, energetic yet gentle, endeared him to all. His many friends in the Societey and elsewhere feel deeply his passing, and realise how great must be the loss to Mrs Payne, to his son, and his other relatives, to whom we offer our heartfelt sympathy.

J. E. S. D.

Percy J. Hanson.

THE tragic death of Percy J. Hanson at the hands of burglars at his place of business deprives our Society of another of the dwindling number of members of the old "North London" period.

He joined the Society in 1897, together with his friend, Oliver G. Pike, with a wide knowledge of our native birds, and a marked aptitude for nature photography, particularly of ornithological subjects, of which he was one of the early exponents.

An accurate observer, with a fine ear for bird song, he visited most of the well-known localities in England and Wales, observing and photographing bird life, and formed an extensive collection of ornithological photographs.

He was for many years a regular attendant at our meetings, and served on the Council as Ornithological Curator, 1920-7. He addressed the Society on several occasions on his favourite subject, showing slides of his own making; his last paper on the "Birds of Winchmore Hill 30 Years Ago" appeared in the *London Naturalist* for 1926.

In latter years he added botany to his interests, our native orchids becoming a special study, but his tastes were also artistic, his collection of woodcuts of the so-called "Golden Period," the 1860's, being comprehensive, and as a taxidermist he prepared numerous skins for the Society's collection. His library was rich in Ornithological and Botanical books, and his collections comprised skins and eggs, entomological specimens and a herbarium, as well as a representative series of English silver coinage and watches.

By his Will he bequeathed his natural history photographs, books and collections to the Society, together with a Legacy of £50.

Of recent years pressure of business prevented him from attending Indoor Meetings, but he was a regular attendant at Field Meetings, and seldom missed the monthly visit to Bookham, thus keeping in touch with our activities. We, as a Society, have lost a loyal and faithful member, and his friends mourn a valued companion, whose memory they will happily preserve.

STANLEY AUSTIN. OLIVER G. PIKE.

STATEMENT OF ACCOUNTS, Year Ended 31st October 1948.

GENERAL ACCOUNT.

Receipts.

Subscriptions—			
Current ...	£527 0 6		
Arrears ...	87 10 6		
In Advance ...	13 12 6		
Entrance Fees ...	19 5 0		
		£647 8 6	
Interest on Post Office Account		6 8 3	
Interest on £75 War Stock ...		2 12 6	
Donations		2 2 0	
		£658 11 3	
Balance, 1st November 1947 ...		46 12 3	
		£705 3 6	

Payments.

Rent		£94 0 0
Syllabus Expenses (Printing and Postage)		74 14 11
Printing and Stationery ...		24 18 8
Postage—Secretary	£7 2 11	
Treasurer	7 7 4	
		14 10 3
Insurance		2 16 10
Gratuities		4 0 0
Subscriptions		6 6 0
Sectional Expenses		28 3 7
Donation—Bookham Common Committee		1 1 0
Chingford Expenses		6 9 7
Grant — "Birds of London Area"		0 16 1
Secretary's Honorarium ...		71 0 0
Library Expenses (2 years) ...		40 0 0
Lecturers' Expenses		8 7 6
Curators' Expenses		0 10 6
Carriage, Insurance, etc., in connection with various bequests of Collections and Books		18 7 1
School Nature Study Union Exhibition Expenses ...		3 0 1
London Naturalist Account ...		248 5 11
		£647 8 0
Balance, 31st October 1948 ...		57 15 6
		£705 3 6

LONDON NATURALIST ACCOUNT.

Sales of *London Naturalist* and *London Bird Report*		£37 4 3
Grant from The Royal Society		48 0 0
Donation		12 0 0
Balance to General Account		248 5 11
		£345 10 2

Printing and Postage — *London Naturalist* and *London Bird Report*		£345 10 2
		£345 10 2

BOTANICAL RECORDS ACCOUNT.

Balance, 31st October 1948 ...		£33 16 7
		£33 16 7

Balance, 1st November 1947 ...		£33 0 1
Interest on Post Office Account		0 16 6
		£33 16 7

The Balances on Life Composition Account and Reserve Account remain at £285 and £90 respectively.

J. H. G. PETERKEN, Hon. Treasurer.

Audited and found correct,
1st March 1949.

C. L. COLLENETTE, Auditor.
E. B. BANGERTER, Auditor.

Official Reports for 1948.

Council's Report.

In October 1948 Membership totalled 952, an increase of 84 on last year's total: at the present rate of increase it will exceed one thousand in 1949.

Although more than 200 meetings are listed in the two six-monthly Syllabuses, attendances continued to rise and the position has now been reached that our usual meeting room at the London School of Hygiene is no longer large enough for meetings of the Ornithological Section. Meetings of this Section will in future be held in the Art-Workers' Guild Hall, or in the Theatre at the London School of Hygiene.

During the year joint meetings were held with the British Bryological Society, the British Mycological Society, The British Trust for Ornithology, the East Grinstead Natural Science Society, and the School Nature Study Union. Invitations to meetings were also received from the Botanical Society of the British Isles and the South London Entomological and Natural History Society. Miss Longfield represented the Society at the International Entomological Congress in Stockholm.

In February a presentation was made by our Honorary President to Mr F. G. Dell, whose retirement after 33 years as Treasurer was recorded in our last report. Subsequently Mr Dell was elected an Honorary Vice-President.

The final Report of the Nature Conservation Sub-Committee was approved by Council and a summary of this Report was sent to all members, with the January-June Syllabus. This called for volunteers to serve on a new permanent Committee and for local representatives to keep watch for any threat to the natural history of the areas recommended in the Society's Nature Conservation Report. Pending the formation of the permanent Committee, Mr Castell has been serving as Acting Nature Reserves Secretary.

A new map of the Society's area is now on sale (price 1s): the scale is half a mile to one inch. The block from which the previous map was printed was the property of the Ordnance Survey and was destroyed by enemy action during the war. The new block has been made from a map drawn by Mr Castell.

The Robbins collection, which has been at the Torquay Museum during the war, has now been brought to London, and although a great deal of curating remains to be done, it will eventually form a valuable addition to our collections. We have to thank the Torquay Natural History Society for their generosity in accommodating this collection for so long. The Society has also benefited from two other important bequests from the late E. B. Bishop and the late P. J. Hanson. We have also to record with regret the deaths of S. W. Bradley, J. Butcher, Sir Lawrence Chubb, E. Claxton, A. McMillan, Mrs E. McKeen, J. W. Moore, J. H. Richter, and Captain B. Tufnell.

Librarian's Report.

IN spite of the fact that about half the Society's meetings are not held at Keppel Street, members have made increasing use of the library.

During the year the library has been enriched by a generous bequest of books, mostly ornithological, from the library of the late Mr P. J. Hanson. For the time being it has not been possible to make these available to members owing to lack of shelf-space. The E. B. Bishop Bequest has been carefully examined. Those books which are needed for the library have been put on the shelves after being rebound where necessary and steps have been taken to dispose of volumes which are not required.

Thanks to the annual grant made by the Council it has been possible to bring the binding of journals and periodicals up-to-date and there should now be no difficulty about keeping abreast of current binding. A start has been made with a card index of the bound volumes in the library. A considerable number of additions to the library has been made by gift, by purchase from the Council's grant for the acquisition of new books and by purchase out of the proceeds of sale of duplicates.

In conclusion I should like to express my appreciation of the valuable help which has been afforded by the Sectional Librarians.

R. W. HALE, *Librarian.*

Chingford Branch Report.

Monthly indoor and field meetings were held as usual by the Branch, and average attendances were for these twenty-two and ten respectively. For the summer indoor discussion meetings, introduced this year the figure is eight. Since the beginning of the year indoor meetings have been held at the Chingford County High School.

Subjects of talks to the Branch were various. Mr W. G. Teagle described Roman Canterbury from first hand experience with the excavations; Mr McKenzie Smith spoke on Norfolk for the naturalist; and Messrs J. Shillito and D. J. Boatman gave a joint paper on ecological methods they had used. Other speakers were Mr B. T. Ward on local plants; Miss C. E. Longfield on Africa; Mr E. A. Round on architecture; and Mr E. B. Pinniger on "Natural History and the Chemist." One meeting was devoted to demonstrations of collecting and preparation technique, the speakers being Messrs Peterken, Hayward, and Pinniger.

At the end of 1947 Mr W. G. Vincent became chairman in place of Mr Peterken, and Mr R. D. Weal joined the Branch Council. During the year the Branch enrolled four associates and three full members. I regret to record the death of Mr J. H. Richter, a Branch Associate. He was known for his interest in the study of pond life.

E. A. ROUND, *Branch Secretary.*

Sectional Reports.

Archaeological Section.

THREE Indoor Meetings were held during the year, one a general meeting in January and two Sectional Meetings in April and December.

On January 20th, Mr J. Harvey gave an illustrated talk on "Some English Medieval Builders." In this, the lecturer spoke on certain notable examples of medieval architecture, laying special emphasis on an aspect of the subject that is usually neglected, i.e. the men who were responsible for the creations. At the Sectional Meeting on April 27th, Mr B. W. Pearce gave a talk on "The Story of Rutupiae." As one who had taken a major part in the work done at Richborough during recent years, Mr Pearce was in a position to give an authoritative and interesting talk on the subject. On December 14th, Mr A. J. Taylor, M.A., F.S.A., gave a talk on "State Conservation of Historic Monuments in Wales and Monmouthshire," and showed many slides illustrating the work done by his department.

Thirteen Field Meetings were held during the year, of which two were in conjunction with the Geology Section and one with the Botany Section. The Geology Section was joined on February 21st (in a snowstorm) for a visit to the Natural History Museum, where Mr K. P. Oakley gave an interesting talk on the special exhibit "Man, the Toolmaker." On February 28th, Mr S. Austin conducted an excursion to the Tower of London and neighbourhood, which was much enjoyed. The geologists were again joined on March 13th, when Mr C. P. Castell took a party to Wimbledon Common. Caesar's Camp was visited, and the leader quoted from some of the later writings on the controversial subject of its true place in prehistory. Waltham Abbey was visited on March 20th, when Mr S. Austin explained something of the features and history of the famous abbey. The objective on April 17th was Stoke D'Abernon, where, under the guidance of Mr J. E. S. Dallas, the church was visited and much of its interesting history and associations explained. On May 23rd, Mr H. G. Singleton took a party to Anstiebury Camp, near Leith Hill. The inherent interest of this Iron Age camp and the beauty of its surroundings rendered worthwhile the effort required to reach it, and thanks are due to Mr Singleton for obtaining from the owner permission to make the visit. Mr W. C. Cocksedge was the leader at Hampton Court Palace on June 19th, when numerous features of antiquarian interest were pointed out to the party. On July 17th, the section visited the famous Barn at Harmondsworth, and other objects of interest in the district. Eltham Palace was visited on August 28th, when Mr E. Yates, F.S.A., showed the party over the historic building and gave an outline of its story. On September 18th, a party was conducted over Southwark Cathedral, and later in the afternoon several historic sites on Bankside were seen. The Botany Section was

joined on October 2nd when, under the leadership of Mr D. H. Kent, Harefield church was examined in detail, and the party was later shown some rare plants in the neighbourhood. On October 30th, Mr W. C. Cocksedge took a party to Greenwich Hospital. The visit included the Chapel, Painted Hall and the National Maritime Museum. In a thick fog on November 27th, fourteen members supported a successful visit to some City churches.

Reading Circle. There are 18 subscribers, and two copies of "Antiquity" are in circulation.

General. The section membership is now 91. It is pleasing to record that Mrs H. E. O'Neil, a member of the section, has been elected a Fellow of the Society of Antiquaries.

W. C. COCKSEDGE, *Chairman.* W. MACKINTOSH, *Secretary.*

Botanical Section.

Membership—The membership of the section is now 216, which shows an increase of 20 during the past 12 months.

Officers—Changes during the year were as follows:—Mr D. H. Kent succeeded Mr C. L. Collenette as chairman, and Mr F. E. Wrighton took over the duties of secretary from Mr G. R. A. Short, who has served faithfully for many years in that office. The section wishes to record its appreciation of this service and is glad to be able to retain Mr Short as Reading Circle Secretary. The committee is as last year, with the addition of Mr C. L. Collenette.

Indoor Meetings—A general meeting was held in May, at which Mr W. H. Spreadbury gave an illustrated talk on "Some Flowers of London's Country." In June a sectional meeting was held which took the form of an exhibition of botanical specimens supplied by members.

Field Meetings—14 excursions have been held with an average attendance of 15 persons. Two meetings were devoted to Bryophytes, one jointly with the British Bryological Society; and one to Fungi in conjunction with the British Mycological Society and the Ecological Section. Areas visited on the other excursions included Kew Gardens, the Chess valley (*Cardamine bulbifera* Cr.), Staines Moor (*Apium inundatum* Rf., *Acorus calamus* L., *Hydrocharis morsus-ranæ* L.), Barnes Common and Thames towpath (*Rosa spinosissima* L., *Rumex pulcher* L., *Archangelica officinalis* Hoffm., *Carex divisa* Huds., *Scirpus maritimus* L.), Ruislip Woods, Chessington (*Geranium pratense* L., *Cirsium pratense* Druce), Leatherhead, R.H.S. Gardens, Wisley, Hounslow Heath (*Hieracium umbellatum* L., *Serratula tinctoria* L.), Keston (*Myrica gale* L., *Convallaria majalis* L., *Drosera rotundifolia* L., *Trigonella ornithopodioides* DC., *Osmunda regalis* L., *Dianthus armeria* L.), and Harefield.

Reading Circle—The annual report of the B.S.B.I. now circulates to 18 members. Owing to an increase in the cost of this journal, a slight increase of the subscription rate will be necessary unless a few more members join the circle.

Library—Our library has been enriched this year by the bequest of our late member Mr E. B. Bishop of many of his books. About 90 of these were botanical, and in addition was a set of the *Journal of Botany* dating from 1905 to 1932. Many of the works were already in the L.N.H.S. library, but 57 volumes and 15 years of the *Journal of Botany* were added. The others were sold mainly to members of the Society, and the sum of approximately £14 so raised will be spent on rebinding or on the purchase of new volumes. The card index for the Botanical Library should be complete in a few months, and the loose-leaf subject index is being kept up to date.

Collections—The curator reports that the collection is in good order and is free from insects. Sheets have been added during the year by Messrs R. S. R. Fitter and D. H. Kent. The herbarium bequeathed by Mr E. B. Bishop is now at the British Museum and is being divided between that institution and the L.N.H.S. The Society will gain many sheets of interesting and uncommon plants, including a number of rare aliens. It is hoped that these sheets will be available by the Spring of 1949. The large and valuable herbarium bequeathed by Mr R. W. Robbins has now arrived in London and is stored temporarily by one of our members. A preliminary examination of it will be made during this winter and a report submitted to the committee of the botanical section. A third herbarium, that of the late Mr P. J. Hanson, has been presented to the Society this year by Mr R. H. Ryall. With his permission most of the sheets have been given to the British Museum but between forty and fifty have been added to the Society's collection.

Juniper Survey—As the species *Juniperus communis* L. is apparently declining in this country, it has been decided to carry on an intensive survey with the object of proving this and of tracing possible causes. Similar work is being done in Yorkshire and we shall have the close co-operation of the botanists so engaged. Mrs B. Welch has undertaken the correlation of the work and would welcome the help of botanists who are prepared to assist in what may well prove an interesting and instructive study. As an introduction to the subject an excursion will be held in May 1949 to the main station of the species in the home counties, and an attempt will be made to estimate the age of the trees. It is hoped that by the end of the year sufficient data will be available to enable a preliminary report to be published.

D. H. Kent, *Chairman.* F. E. Wrighton, *Secretary.*

Ecological Section.

Membership of the Section continues to grow and is now 184. The Section was responsible for the organising of three General Meetings, when it was fortunate enough to secure Dr O. W. Richards to lecture on " Ecological Aims and Methods for Zoologists " (see p. 23), Mr C. C. Fagg on " Field Study Centres and the Amateur Naturalist," and Mr R. S. R. Fitter to open a discussion on " Nature Conservation in the London Area." Three Sectional Meetings were also held, and included discussions on " Field Methods in Bird Ecology," opened by Dr

G. Beven and Mr P. W. E. Currie, and on "Ecological Surveys and the Amateur Naturalist," opened by a paper by Major J. L. Harrison, read, in his absence abroad, by Mr C. P. Castell, and a paper on "The Ecology of Seaweeds" by Mr A. H. Norkett. Dr Beven's valuable contribution has, through the generosity of one of our members, been made available in the form of a duplicated pamphlet which may be obtained (price 3d) from the Sectional Secretary.

The monthly meetings at Bookham were attended by an average of 13 members. On May 2nd, Mr Castell conducted eight members over Bookham Common and demonstrated aspects of the Section's work. 34 members of the British Mycological Society and of the Botanical Section visited the Common on October 3rd under the leadership of Mr Castell; in spite of a month's drought and an apparent absence of fungi, some 65 species were recorded.

Considerable progress has been made during the monthly visits of the Section to the City Bombed Sites between April and October, the botanical work of the survey in 1948 being summarised by Mr F. E. Wrighton on p. 39.

The Reading Circles are in a flourishing condition with a record number of 42 subscribers.

L. Parmenter, *Chairman.* C. P. Castell, *Secretary.*

Entomological Section.

This year has been a poor one for field work, and our field meetings have suffered in consequence, but we have had some outstandingly successful indoor meetings, and it is clear that the Section has a keen and active membership. Four sectional and one general indoor meetings have been held since the last A.G.M.

On 9th December 1947, Mr E. W. Classey read a paper on British Mosquitoes, and on 24th February 1948, Mr J. F. Shillito gave a talk on "Some Aspects of Insect Ecology." The attendance of 54 on this occasion must be a record for a meeting of the Section. On 25th May, Dr B. P. Uvarov gave a talk on "Grasshoppers and Locusts," illustrated by live specimens of locusts, and on 28th September the evening was devoted to exhibits and short notes by members. For the second time this proved a great success, 13 members contributing exhibits of recent researches in several Orders. Attendance at these meetings has averaged 39, compared with 23 during last year.

At a general meeting of the Society on 6th April, Mr E. E. Syms gave an interesting talk entitled "Difficulties of a Nature Photographer."

Owing to generally poor weather at week-ends the field meetings have not been well attended, the average attendance being 6. On 27th June a successful day was enjoyed on Send Heath and along the River Wey, and at Shoreham, Kent, on 15th August, Mr P. W. E. Currie took specimens of *Athalia rosae* (Hym., Tenth.). Eight field meetings in all have been held, and in addition several members of the Section have been actively taking part in the Society's surveys.

Mr E. B. Pinniger resigned the sectional curatorship at the beginning of the year, and Mr R. D. Weal has taken his place. Mr D. A. Bennett has joined the committee for the first time.

We regret to have to record the deaths of two members, Messrs J. W. Moore and S. W. Bradley.

Total membership of the Section is now 135, an advance on last year's figure.

Twenty-seven members belong to the Section's reading-circle, which circulates the *Entomologist*, *Entomologist's Monthly Magazine* and *Entomologist's Record*.

Re-arrangement of the collections has continued. The Coleoptera and Heteroptera have been completed and work has been begun on the Diptera. Donations of specimens of Coleoptera, Lepidoptera, Diptera and Heteroptera have been received from Messrs F. D. Buck, C. N. Colyer, J. Cowley, T. R. Eagles, B. J. Healey, A. H. Sculthorp and R. D. Weal, to whom our thanks are due. In addition the Section has received a small collection of Lepidoptera from the late Mr P. J. Hanson, including two specimens of native *Lycaena dispar*, the Large Copper.

A card index of the entomological library has been begun.

Cynthia Longfield, *Chairman*. R. M. Payne, *Secretary*.

Geological Section.

This year the Section has been getting into its stride. Membership has increased by over 50% and now stands at 56. Five indoor meetings were held and fourteen field meetings, compared with four and twelve respectively last year. No meetings were possible during the summer owing to the difficulty in securing leaders during the session of the International Geological Congress in London.

The indoor meeting held at Keppel Street in June was devoted to an Exhibition of Specimens by members and many interesting collections were on show. Dr J. F. Hayward exhibited a large collection of rock specimens illustrating stratigraphy. Mr J. N. Carreck showed an interesting collection of fossils from various parts of Southern England, and Mr R. F. Moorman displayed a large collection of fossil vertebrates from the Hampstead Beds of the Isle of Wight. Other exhibits were:— Rock specimens from N.W. Highlands of Scotland (E. A. Round); Upper Greensand fossils from Weymouth (Mrs Ainsley); Flint Casts (H. Banks); and a series of species of Micraster illustrating the evolution of the genus (B. Ainsley). At the other indoor meetings arranged by the Section the following lectures were delivered:—"Fossils and Fashions" by Dr H. Dighton Thomas; "Geology and the City of London" by Dr J. F. Hayward; "Do Continents Drift?" by H. D. Weaver; and "Our Geological Reserves as Keys to London's Geology" by C. P. Castell.

Three museum meetings were held. At the Geological Survey and Museum Mr E. F. Bunt gave an excellent demonstration on the Geology of the London District. On another occasion Mr P. A. Sabine showed members some of the more interesting Gemstones on exhibition and afterwards the party visited the museum lecture theatre where the leader

had microscopes and other apparatus displayed to illustrate his remarks on the commercial uses of gems. At the Natural History Museum Dr K. P. Oakley gave a demonstration on "Man, the Toolmaker," introducing members to the newly arranged show cases displaying the works of Early Man.

The Section was joined by members of the Archaeology Section on a visit to Miss Johnston's private collection. In March the first outdoor meeting was a joint visit to Wimbledon Common with the Archaeology Section led by Mr C. P. Castell. In April a visit was made to The Royal Botanic Garden at Kew with the Botany Section. Modern representatives of Ancient Types of Plants were examined under the direction of Mr E. Nelmes. A visit to Bayford and Hertford was made later in the month led by Mr J. D. Weaver. In May an enjoyable day was spent in the Tilburstow Hill district with Mr C. P. Castell, the party fortunately escaping the rain which prevailed in adjacent areas. In June Mr G. F. Elliott led a field meeting to Godalming where members had the opportunity of examining and collecting from some of the best exposures of the Bargate Beds (a local development of the Folkestone Beds). The meeting involved a walk through one of the most beautiful parts of Surrey but unfortunately rain overtook the party in the early afternoon and rather marred the enjoyment besides preventing a detour to examine more closely the Chapel of Charterhouse School which is built of Bargate stone. Later in the month an evening meeting was held in the City of London when a party of 25 members traced part of the course of the Holebourne river under the direction of Dr J. F. Hayward. Harefield was visited on June 26th with Mr S. W. Hester, and members were able to examine the Cretaceous-Eocene unconformity. Examples were seen of the borings attributed to a terebratulid worm in the eroded surface of the chalk at the time when it was exposed to wave action before the overlying Reading Beds were deposited. Specimens of the fossiliferous boulders from the base of the London Clay were found. Some of the party collected fossils from the chalk: Mr J. N. Carreck being fortunate enough to find a well preserved fossil fish. Horsley and the North Downs were visited with Mr B. Ainsley in July. Exposures of the Netley Heath deposits were examined. The leader stated that the material is considered to be of Red Crag (Pliocene) age and to have been transported to its present position by small glaciers during the ice age; the original site on which the material was deposited by the Pliocene sea having subsequently been completely denuded away leaving only the derived material seen, as evidence of its original existence. Quarries in Upper, Middle and Lower Chalk were visited and the party finished up at Abinger Hammer for tea. At the end of September Mr J. N. Carreck led a party of members to Ightham and Wrotham where good exposures of the Gault Clay and the Lower Greensand were visited and a wide variety of geological features was studied. In early October the section spent an interesting afternoon with Mr C. W. Wright examining the well-known section in Gault Clay at Dunton Green. The leader took the party zone by zone through the sequence of

beds in the Upper and Lower Gault exposed, pointing out many of the characteristic Ammonites and other fossils at each horizon and naming specimens collected by members.

A circular was issued in September containing more details of field meetings than it was possible to include in the Syllabus, and a copy was sent to all members of the Section. It is proposed to issue further circulars in the future covering most of the field meetings. Members of the Society who are not members of the Section may have copies on application to the Sectional Secretary.

Some concern has been felt regarding the lack of co-operation by members in assisting the Recorder of Temporary Sections, and it has been decided to form a small committee to promote further activity in this respect. It is hoped to enlist the support of all members of the Section and so successfully carry out the obligation of the Society to keep a complete record of all temporary exposures within the Society's area.

The thanks of the section are due to those geologists who so willingly conducted these meetings and to the owners of quarries and works for permitting the Society to visit their properties.

JOHN F. HAYWARD, *Chairman*. B. AINSLEY, *Secretary*.

Ornithological Section.

Membership—The year has seen a continued increase in the Sectional membership, which now totals 653, of which 588 are Full Members, 27 are Branch Associates and 38 are Country Associates.

Lectures—Eleven indoor meetings have been held during the year, the Section having arranged lectures for five General Meetings. At these Mr Eric Hosking gave an illustrated talk on "Marsh and Montagu's Harriers and other Norfolk Birds," and Mr G. K. Yeates showed us pictures of "The Birds of the Camargue." Mr P. E. Brown spoke on "Bird Protection: its purpose and prospects"; Mr H. Bentham on "Some changes in the avifauna of North-East Surrey"; and Mr D. Seth-Smith gave an illustrated lecture on "Bird Display."

The Sectional Meetings included "Ringing Duck at the Orielton Decoy" by Mr C. T. Dalgety and "Bird Observatories" by Mr George Waterston, both with lantern slides. Mr E. M. Nicholson gave us "The Birds of the North Atlantic" and Mr R. J. Raines spoke on "Inland Migration, with special reference to Nottingham Sewage Farm."

The remaining meetings were devoted to "A discussion on the Work of the Section" and "Three Short Papers by Members"; these were "Some results of the Bookham Survey" by Mr P. W. E. Currie, "A local Gravel Pit" by Mr H. E. Andrews and "Some thrills of a Bird Photographer" by Miss C. M. Acland.

Personnel—During the year Mr C. B. Ashby succeeded Mr E. R. Parrinder as Chairman of the Records Committee and Editor of *The London Bird Report*, Mr H. F. Greenfield becoming Recorder for South of the Thames. Mr P. E. L. Simmonds succeeded Mr R. W. Hale as

Sectional Librarian. Messrs E. R. Parrinder, R. W. Hale and R. H. M. Ryall joined the committee in place of Mr R. S. R. Fitter, Dr G. Beven and Mr C. W. G. Paulson.

It is with great regret that we have to record the death of two well-known members of the Section, Mr L. M. Emberson and Mr P. J. Hanson. The former was a very active member before the war and a regular contributor to the annual report. As a result of his work abroad it was a number of years since he had been a frequent attendant at meetings, but there are many who will remember his energy and enthusiasm and who will wish to join with us in extending sympathy to his wife. An obituary notice of the late Mr Hanson appears elsewhere in this issue, but we must mention here the gratitude of the Section for his very valuable bequest, including a large series of county histories and other valuable books. His cheery presence on field meetings will be sadly missed by his many friends.

Publications—Over half of the first printing of Field Record Cards have now been sold, the amount originally raised by private subscription has been paid off and a balance remains in hand.

Exhibition—The Section accepted the invitation of The School Nature Study Union to take part in their autumn exhibition at University College. Diagrams, maps and display matter illustrative of the Section's work were shown, the subjects being:—The Great Crested Grebe census, Recoveries of Blackheaded Gulls ringed in London and Starling Roosts in the London Area.

Field Meetings—Fifty-three field meetings have been held, with an average attendance of 19: the species seen totalled 148, of which great grey shrike, rough-legged buzzard, hen harrier and little-ringed plover are worthy of special mention. Expeditions to the estuaries and Tring Reservoirs were among the most popular and 56 members attended a meeting at St James' Park for the identification of duck.

Reading Circles and Book Fund—We are now circulating twelve copies of *British Birds* to 104 subscribers, any profits being devoted to the purchase of books for the library. New circles for *The Scottish Naturalist*, the *Auk* and *Bird-Banding* have been formed.

Library—An ever-increasing number of books is being borrowed from the library and the new system of slips is working well. The binding of local reports is now up-to-date and the general cataloguing, which is well under way, should be finished this winter. Among the many additions is a second copy of *The Handbook of British Birds*, which may be had on loan.

Curator's Report—Nine new skins and several wings, from birds found dead, have been added to the collection during the year. The Section has been fortunate in enlisting the valuable services of Mr C. A. White, who has spent a great deal of time in bringing the egg collections into a more useful state. These are being re-sorted, labelled and catalogued.

The valuable collection of eggs belonging to the late Mr P. J. Hanson and presented to the Society by his sisters has been taken over together

with a part of the Sladen Collection, both of which have been of material assistance in making the whole collection more representative.

The collection of 2668 photographs, representing 259 species on the British List, has now been card-indexed. Of this impressive total no less than 2219 are from the late Mr Hanson's estate.

Members are reminded that good photographs of typical bird habitats are still required.

Ringing—The Society's returns to the Bird Ringing Committee of the British Trust for Ornithology, for the 1947-1948 season, show an increase over the previous year—615 birds having been ringed by the 28 members concerned. Among 60 species represented, two roseate terns, eighteen kestrels, twelve buzzards and ten reed-warblers are noteworthy. An arrangement has now been made with the British Trust for Ornithology by which the Society is notified of all recoveries of birds ringed by members instead of only the more important ones.

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A considerable amount of abstractions of records from periodicals has now been carried out in preparation for the book on *The Birds of the London Area, 1900-1950.* The census of herons and great-crested grebes, the observations on black redstarts and little ringed plovers, and the winter census of ducks have all been continued, while the first year of a survey of four selected gravel pits has been completed. Support for the enquiry into the tameness and feeding habits of garden birds has been disappointing and more contributions would be welcomed.

Fuller details of field work appear in *The London Bird Report*, which continues to increase in size.

R. C. Homes, *Chairman.* W. D. Melluish, *Secretary.*

Plant Galls Section.

Two meetings have been held at Keppel Street during the year, and papers read:—9th March—"Galls of *Aulacidea* and their Flies," M. Niblett, "*Cynips kollari*," J. Ross. 12th October—"Fungus Galls," M. Niblett, "Mite Galls," H. J. Burkill.

The following Outings were carried through:—1st May—Worms Heath, M. Niblett. 22nd May—Effingham Common, M. Niblett. 19th June—Box Hill, M. Niblett. 17th July—Ranmore Common, M. Niblett. 7th August—Bookham Common, H. J. Burkill. 11th September—Fetcham Downs, H. J. Burkill 18th September—Oxshott, H. J. Burkill. 2nd October—Abbey Wood, H. J. Burkill. The attendances at these showed a welcome increase in numbers.

M. Niblett, *Chairman.* H. J. Burkill, *Secretary.*

Ramblers' Section.

Membership of the Section remains about 70. Two indoor meetings of the Section were arranged for the year. The first indoor meeting on April 20th was well attended when a lecture descriptive of the work of

the Council for the Preservation of Rural England was given by Mr H. V. Osmond, Assistant Secretary of the Council. The second indoor meeting took place on November 23rd, when Mr W. N. Croft, B.A., F.G.S., a Senior Scientific Officer on the staff of the Natural History Museum, gave a graphic commentary on a most interesting film, entitled "Life in Graham Land." There was an audience of 40 members and friends.

Twelve excursions have taken place this year and the average attendance has been eleven. The places visited on these excursions were the Dickens House in Doughty Street, Bloomsbury; the South Downs; Richmond Park; Knole; Trent Park; Fyfield in Essex; Box Hill; Old Hampstead; the R.H.S. Gardens at Wisley; Woldingham; and the Imperial War Museum, Lambeth Bridge Road.

The Easter week-end on the South Downs, ably organised by Miss R. Davis, was spent at Singleton, a very good centre near Goodwood, and many rambles by footpaths were followed. The Knole visit coincided with a very wet day, but we were somewhat consoled for the loss of our walk across the Park by the beauties of the house and its treasures which, in the circumstances, were all the more appreciated. On the Fyfield outing the Rose-flowered Pea, peculiar to the district, was met with, also the Sulphur Trefoil.

We should like to thank all the Leaders of these interesting excursions. We also wish to place on record the indebtedness of the Section to the late Mr P. J. Hanson for his kind leadership on many occasions.

The Section regrets to record the loss by death of a noted Rambler member in Sir Lawrence Chubb.

The *Commons, Open Spaces and Footpaths Preservation Handbook* has been circulated to the members of the Ramblers' Reading Circle in the usual way.

H. Spooner, *Chairman.* L. J. Johns, *Secretary.*

List of Members.

(Corrected up to 1st October 1949).

It is particularly requested that Members will inform the Secretary as soon as possible of any change of address.

For list of abbreviations, see end.

Honorary President:

PROF. M. GREENWOOD, D.Sc., F.R.S., F.R.C.P.

Honorary Vice-Presidents:

E. A. COCKAYNE, M.A., D.M., F.R.C.P., F.R.E.S. F. G. DELL. A. B. HORNBLOWER.
A. HOLTE MACPHERSON, B.C.L., M.A., F.Z.S. J. ROSS.

Honorary Members:

1916 Brown, A., F.Z.S., 64 Sancroft Road, Eastbourne, Sussex. (Arch., Geol., Orn., R.)
1933 Bryce, E. J., Nelson Road, Killara, Sydney, N.S.W. (Zoo.)
1927 Clanchy, Mrs B. L., Westminster Bank, Harrow-on-the-Hill, Middx. (Orn., R.)
1904 Cooke, Rev. P. H., B.A., Church Gates, Old Heathfield, E. Sussex. (Arch., Bot.)
1927 Le Souef, A. S., C.M.Z.S., R.A.O.U., Taronga Zoological Park, Sydney, N.S.W.

Members:

1946 Absolon, Miss E. M., 23 Netherlands Road, New Barnet, Herts. (Bot., Ent.)
1929 Acland, Miss C. M., M.B.O.U., 2 Orchard Close, Banstead, Surrey. (Orn.)
1946 Adams, Mrs J. M., B.Sc., F.Z.S , 43 Merchland Road, New Eltham, S.E.9. (Bot., Orn.)
1946 Ainsley, B., F.G.S., 18 Walpole Court, Hampton Road, Strawberry Hill, Twickenham, Middx. (Geol.)
1946 Ainsley, Mrs B., 18 Walpole Court, Hampton Road, Strawberry Hill, Twickenham, Middx. (Bot., Ecol., Geol.)
1947 Aldhous, J. R., 161 South Norwood Hill, S.E.25. (Bot., Geol.)
1944 Allden, Miss B. J., 110 The Ridgeway, Enfield. Middx. (Orn., R.)
1947 Allder, R. C., 32 Preston Road, Wembley, Middx. (Orn.)
1939 *Allen, Miss D. (address not known).
1945 Allison, J. R., 9 Littlecroft, Eltham, S.E.9. (Orn., Pl. G.)
1947 Almond, Miss G. M., 26 Roy Road, Northwood, Middx. (Bot., Orn.)
1937 Alston, A. H. G., B.A., F.L.S., British Museum (Natural History), Cromwell Road, S.W.7. (Bot.)
1949 Anderton, Miss M., 45 Shenley Avenue, Ruislip Manor, Middx. (Bot., Geol.)
1946 Andrews, H. E., 48 Fanshawe Avenue, Barking, Essex. (Ecol., Orn.)
1932 Angell, Miss K. W., Stockwell College, The Old Palace, Bromley, Kent. (Bot., Ecol., Ent., Orn., Pl. G., R.)
1948 Anscombe, Miss E. M., "Domus," 77 Hillingdon Hill, Hillingdon, Middx. (Bot., Orn.)
1948 Anscombe, Mrs J. M., "Domus," 77 Hillingdon Hill, Hillingdon, Middx. (Bot., Orn.)
1932 Arbon, Mrs J. A., Brookside, Eversley Park Road, N.21. (Arch.)
1946 Archer, E. H., 17 John Islip Street, Westminster, S.W.1. (Bot., Orn.)
1946 Archer, Miss E. M., 95 Church Road, Wimbledon, S.W.19. (Orn.)
1942 Archer, H. A., 76 Endlebury Road, E.4. (Orn.)
1945 Ardley, M., 28 Corbets Avenue, Upminster, Essex. (Fr. water and marine life, Orn.)
1947 Arnold, Miss K., 43 The Quadrant, Wimbledon, S.W.20. (Orn.)
1947 Arnold, Miss W., 43 The Quadrant, Wimbledon, S W.20. (Orn.)
1939 Ashby, C. B., 20 Denmark Road, Carshalton, Surrey. (Ecol., Orn.)
1949 Ashby, F., 40 Bradbourne Street, Parsons Green, S.W.6. (Geol.)
1949 Ashley, Mrs J. L., 32 Warminister Road, South Norwood, S.E.25. (Orn.)
1946 Ashley, R. S., 32 Warminster Road, South Norwood, S.E.25. (Lep., Orn.)

1892 Austin, S., F.Z.S., 43 Darenth Road, N. 16. (Arch., Bot., Ecol., Orn., R.)
1948 Avery, E. J., 20 Bramley Road, Sutton, Surrey. (Orn.)
1931 Back, Dr Marjorie, 29 York House, Upper Montagu Street, W.1. (Bot., Orn.)
1929 *Bagnall, R. S., D.Sc., F.R.S.E., 33 Park Parade, Harrogate, Yorks. (Bot., Ent., Pl. G.)
1944 Bailey, A. J. M., B.Sc., F.R.I.C., 3 East Road, Maidenhead, Berks. (Bot., Ecol.)
1946 Bailey, J. A., 40 Ivanhoe Drive, Kenton, Middx. (Ent., Orn.)
1927 Baily, Miss A. R., F.Z.S., Cressex Lodge, Binfield, Berks. (Arch., Bot., Ent., Orn., Pl. G., R.)
1944 Bain. Miss P. C., St Boswells, Dene Road, Northwood, Middx. (Bot., Ent., P.L.)
1946 Bak, F. A., "Craigmore," 46 Holmfield Road, Leicester. (Orn.)
1948 Baker, L., 5 Hanger Court, Hanger Green, Ealing, W.5. (Orn.)
1941 Ballingal, N. C., 120 Cranmer Court, S.W.3. (Orn.)
1947 Balme, Miss O. E., Cherry Trees, Rotherfield Greys, Henley-on-Thames, Oxon. (Orn.)
1947 Bangerter, E. B., 196 Stroud Green Road, Hornsey, N.4. (Bot., Ecol.)
1934 Banks, H., 64 Queenswood Road, Hounslow, Middx. (Bot., Ecol., Geol., Orn.)
1949 Barber, Miss H. M., The Rectory, Great Coates, Grimsby, Lincs. Temporary address :—63 Belsize Avenue, N.W.3. (Orn.)
1947 Barclay, C. G., Fanshaws, Hertford. (Orn.)
1927 Barclay-Smith, Miss P., F.Z.S., M.B.O.U., 51 Warwick Avenue, W.9. (Orn.)
1946 Barker, Miss P. M. W., 232 Cannon Lane, Pinner, Middx.
1946 Barker, R. J., "Domus," Oatfield Road, Orpington, Kent. (Ent., Orn.)
1926 Barnes, Mrs E. C., M.B.O.U., Hungerdown, Seagry, Wilts. (Bot., Ecol., Orn.)
1941 *Barrington, F. J. F., 52 Harley Street, W.1. (Orn.)
1941 Bartlett, T. L., B.A., M.B.O.U., 91 Woodend Avenue, Roxeth, Harrow, Middx. (Ecol., Orn.)
1946 Bateman, Miss E., 71 Grange Road, Ealing, W.5.
1903 *Battley, Mrs, 1 Sydney Road, Guildford, Surrey.
1946 Batts, M. S., 17 Heslop Road, Balham, S.W.12. (Orn.)
1946 Batts, S. G., 17 Heslop Road, Balham, S.W.12. (Orn.)
1946 Bawtree, R. F., Studley Priory, Horton-cum-Studley, Oxford. (Orn.)
1948 Baxter, Miss V. H., 39 Church Vale, East Finchley, N.2. (Orn.)
1915 Bayne, C. S., Savage Club, 1 Carlton House Terrace, S.W.1. (Ecol., Orn.)
1946 Beal, N. A. G. H., 1 Auriol Road, W.14. (Orn.)
1943 Beamish, A. J., Epping House, near Hertford. (Orn.)
1947 Beattie, Mrs M. G., 86a Portland Place, W.1. (Orn.)
1947 Beauchamp, D. M. W., Four Winds, Keswick Road, Fetcham, Leatherhead, Surrey. (Orn.)
1946 Beazley, His Honour Judge Hugh, J.P., Bell House, Bell Lane, Broxbourne, Herts (Orn.)
1944 Beddington, A., Lily Farm, Princes Risborough, Bucks. (Ent., Mam., Orn.)
1946 Bedford, W. D., F.R.E.S., The Ferris, Mill Lane, Broxbourne, Herts. (Orn.)
1943 Beesley, J. S. S., 412 Upper Elmers End Road, Eden Park, Beckenham, Kent. (Bot., Ecol., Orn.)
1947 Bellairs, A. d'A., Department of Anatomy, London Hospital Medical College, Turner Street, E.1. (Amph., Mam., Rep.)
1949 Bengeri, V. L., 15 Queen's Road, Hendon, N.W.4. (Arch., Geol.)
1947 Bennett, D. A., 73 Ellesmere Avenue, Mill Hill, N.W.7. (Col., Lep.)
1946 Bennett, Miss E. A., 16 Inchmery Road, Catford, S.E.6. (Ecol., Orn.)
1948 Bennett, Miss M., 167 Farley Road, Selsdon, South Croydon, Surrey. (Orn.)
1946 Bensley, Lt.-Col. C. J. F., c/o Lloyds Bank Ltd., Cox's and King's Branch, 6 Pall Mall, S.W.1. (Conch., Ecol., Ent., Geol.)
1929 *Benson, R. B., M.A., F.R.E.S., British Museum (Natural History), S.W.7. (Bot., Ecol., Ent., esp. Sawflies, Orn., Pl. G., R.)
1932 Bentham, C. H., Eothen, 11 Epsom Lane South, Tadworth, Surrey. (Orn.)
1948 Beresford, Miss A. K., "The Hall Studio," 23b Grove End Road, N.W.8. (Orn.)
1937 Best, Miss M. G., M.R.C.S., L.R.C.P., 115 Widmore Road, Bromley, Kent. (Orn.)

1940 Beven, G., B.Sc., M.B., B.S., M.R.C.S., M.B.O.U., Grove Park Hospital, Lee, S.E.12. (Ecol., Orn.)
1948 Bicker, Miss J., Goldsmiths House, Park Village East, Regents Park, N.W.1. (Orn.)
1946 Bilby, H. A., M.B.O.U., 2 Sunnyside Cottages, Harlington, Middx. (Orn.)
1932 Binley, Sister E. M. (address not known). (Orn., R.)
1946 Bird, Miss B. J., 5 Greenend Road, Bedford Park, W.4. (Orn.)
1946 Bird, Miss M. I., 13 Eton Road, Hampstead, N.W.3. (Bot., Geol., Orn.)
1946 Bird, Miss P. E., Out Patient Dept., Guys Hospital, S.E.1. (Orn.)
1941 Bispham, T., B.Sc., A.I.C., 2 Chestnut Avenue, Wembley, Middlesex. (Orn.)
1930 Blair, K. G., D.Sc., F.R.E.S., Pentwyn, Afton Road, Freshwater, I.o.W. (Ent.)
1939 Blake, E. A., 16 Lindsay Road, Worcester Park, Surrey. (Orn.)
1937 Blake, F. W., 16 Lindsay Road, Worcester Park, Surrey. (Orn.)
1948 Blencowe, Miss E. J., c/o Matron's Office, St Thomas's Hospital, S.E.1. (Ent., Orn.)
1943 Boatman, D. J., 7 Hurst Road, Buckhurst Hill, Essex. (Biol , Bot., Ecol., Ent., Orn.)
1946 Boggis, Miss L., 60 Shuttleworth Road, S.W.11. (Arch., Geol., Orn., R.)
1947 Bond, Miss D., 33 Florence Road, Stroud Green, N.4. (Bot., Orn.)
1947 Boniface, R. A., 5 Grosvenor Road, Chiswick, W.4. (Bot.)
1947 Boorne, Miss A. G., 188 Greenvale Road, Eltham Park, S.E.9. (Orn.)
1945 Boucher, F. P. D., 17 Helena Court, Eaton Rise, Ealing, W.5. (Arch., Bot., Geol.)
1941 Bourne, K. W., 47 West Way, N.W.10. (Ecol.)
1946 Boyson, A. T., 53 Rosslyn Hill, Hampstead, N.W.3. (Geol., Orn.)
1949 Boys-Stones, P., 7 Burnaby Road, Bedford. (Orn.)
1945 Braby, C., 5 Arundel Street, W.C.2. (Orn.)
1946 Bradbrooke, Mrs J., 34 West Hill Court, Millfield Lane, N.6. (Orn.)
1948 Bradford, Miss L., 54 Thornby Road, Clapton, E.5. (Bot.)
1932 Braithwaite, Miss D. M., 18 Warren Road, E.4. (Orn.)
1910 Braithwaite, Miss N. A., 18 Warren Road, E.4.
1947 Branscombe, P. J., 20 Alleyn Road, West Dulwich, S.E.21. (Orn.)
1946 Brewer, Mrs W., 120 Parkside Avenue, Barnehurst, Kent. (Orn.)
1949 Brick, Miss D., 39a Eresby House, 19 Rutland Gate, S.W.7. (Arch., Orn., R.)
1937 Brightwell, L. R., F.Z.S., White Cottage, Chalk Lane, East Horsley, Surrey. (Marine Life)
1946 Britten, R. O., 21 Tollers Lane, Old Coulsdon, Surrey. (Orn.)
1942 Bromley, F. C., 93 Wolmer Gardens, Edgware, Middx. (Orn.)
1948 Bronner, Miss E., 37a The Gardens, East Dulwich, S.E.22. (Arch.)
1937 Brown, Miss B. E., Gresham Cottage, Granville Road, Limpsfield, Surrey. (Ecol., Orn.)
1948 Brown, K. M. E., 814 Great West Road, Osterley, Middx. (Orn.)
1948 Brown, Mrs M. E., 814 Great West Road, Osterley, Middx. (Orn.)
1947 *Brown, Miss M. M., 27 The Pleasance, Putney, S.W.15.
1948 Brown, P. E., Kiln Cottage, Baughurst, Basingstoke, Hants. (Orn.)
1948 Brown, Mrs R. S., 6 Holland Park Road, W.14. (Orn.)
1940 Browne, Miss E. Gore, 3 Claremont House, Lithos Road, N.W.3. (Orn.)
1948 Buckell, L. E., The Hatch, Epsom Road, Leatherhead, Surrey. (Bot., Lep., R.)
1948 Buller, Lt.-Cdr. D. N., D.S.C., 8 Crowland House, 28 Panton Street, W.1. (Orn.)
1947 Bunker, Miss M. K., 105 Campden Hill Road, Kensington, W.8. (Orn.)
1936 Burd, L. H., Cross House, Shroton, Blandford, Dorset. (Ecol., Ent., Orn.)
1930 *Burgham, Miss J. E., 2 Nevern Place, S.W.5. (Geol., Orn., R.)
1915 Burkill, H. J., M.A., F.R.G.S., 3 Newman's Court, Cornhill, E.C.3. (Bot., Ecol., Geol., Lep., Orn., Pl. G., R.)
1947 Burnett, P. N., 29 Kelsey Way, Beckenham, Kent.
1946 Burra, Miss E. T., 48 Gloucester Place, W.1. (Orn.)
1943 Burt, Miss E. H., 42 Hawthorne Avenue, Palmers Green, N.13. (Geol.)
1949 Burton, B. E., 61 Burlington Avenue, Kew Gardens, Surrey. (Orn., R.)
1946 Burton, J. F., F.R.E.S., 43 Eversley Road, Charlton, S.E.7. (Lep., Orn.)

1946 Bussey, G. W., 87 Mount Ararat Road, Richmond, Surrey. (Orn.)
1949 Butler, P. R. A., 6 Ennismore Gardens, S.W.7. (Orn.)
1948 Butler, R. E., B.Sc., 100 Lyndhurst Avenue, Twickenham, Middx. (Bot., Geol.)
1937 Butlin, Major J. H., c/o 90 East Sheen Avenue, S.W.14. (Orn.)
1935 Butterworth, Miss M. H., Benrose, King Street, Warminster, Wilts. (Bot., Ecol., Orn.)
1947 *Cadbury, J. C., "Beaconwood," Rednal, Birmingham. (Orn.)
1932 Caiger-Smith, Miss J., Ibstock Place, Clarence Lane, S.W.15. (Orn.)
1938 Calvert, G. W., 97 Abbot's Road, Abbot's Langley, Herts.
1928 *Campbell, J. M. H., M.D., 47 Arkwright Road, N.W.3. (Orn.)
1949 Campbell, Miss M. L., 15 Trinity Rise, Tulse Hill, S.W.2. (Orn.)
1912 Capleton, A., Hotel Stuart, Richmond, Surrey. (Bot., Ecol., Mam., Orn., R.)
1947 Carpenter, Miss M. I., Salomon's Centre, Guy's Hospital, S.E.1. (Orn.)
1949 Carpenter, Miss T., 40 Waterfall Road, New Southgate, N.11. (Ecol., Orn.)
1947 Carreck, J. N., 10 Palace Grove, Bromley, Kent. (Arch., Ecol., Geol.)
1932 Castell, C. P., B.Sc., 52 Graham Road, S.W.19. (Arch., Bot., Conch., Ecol., Geol., Orn.)
1947 Cattee, Miss M., c/o Miss Kenrick, 11 Pembridge Villas, W.11. (Bot.)
1946 Cawood, Miss H. M., Walthamstow Hall, Sevenoaks, Kent. (Orn.)
1945 Chalke, Mrs K. I. M., 20 South Drive, Cheam, Surrey. (Orn.)
1945 Chalke, S. H., 20 South Drive, Cheam, Surrey. (Ecol., Orn.)
1946 Chambers, Miss R. C., 1 Manor Close, Mill Hill, N.W.7. (Orn.)
1930 Chandler, S. E., D.Sc., F.L.S., 59 Anerley Park, Penge, S.E.20. (Bot., Ecol.)
1949 Chapman, Miss L., 7 Acland Crescent, Denmark Hill, S.E.5. (Bot., Orn.)
1948 Chappell, H. J., 24 Hillcrest Road, Loughton, Essex. (Orn.)
1947 Chard, W. E., "Lucerna," 47 Beckenham Road, West Wickham, Kent. (Orn.)
1947 Charlton, Miss M. W., 61 Streatham Close, Leigham Court Road, Streatham, S.W.16. (Bot., Ecol.)
1949 Charter, G. B., 8 Tregunter Road, The Boltons, S.W.10. (Orn.)
1946 Chave, S. P. W., 15 Glenhurst Rise, Beulah Hill, S.E.19. (Orn.)
1948 Clark, L. L., 80 Castelnau, Barnes, S.W.13. (Orn.)
1929 Coates, Miss N. H., Woodhouse, Beaumont Road, S.W.19. (Bot., Orn.)
1904 Cockayne, E. A., M.A., D.M., F.R.C.P., F.R.E.S., 8 High Street, Tring, Herts. (Biol., Lep.)
1945 Cocks, E., 109 Riefield Road, Eltham, S.E.9. (Amph., Mam., Rep.)
1925 Cocksedge, W. C., 10 St Mary's Avenue, Shortlands, Bromley, Kent. (Arch., Bot., Ecol., Geol., Orn.)
1929 Cocksedge, Mrs, 10 St Mary's Avenue, Shortlands, Bromley, Kent. (Arch., Bot., Ecol., Geol.)
1949 Coghlan, T. P., 27 Abbotsbury Gardens, Eastcote, Pinner, Middx. (Orn.)
1947 Cohen, C. S. M., 48 Keyes Road, Cricklewood, N.W.2. (Orn.)
1945 Cole, G. P., 19 Crossway, Bush Hill Park, Enfield, Middx. (Ecol., Orn.)
1948 Colinvaux, P. A., 127 Edgwarebury Lane, Edgware, Middx. (Col.)
1907 Collenette, C. L., F.R.G.S., F.R.E.S., 15 Warren Avenue, Richmond, Surrey. (Api., Bot., Ecol., Ent., Orn.)
1932 Collenette, Mrs C. L., 15 Warren Avenue, Richmond, Surrey. (Orn.)
1936 Collett, R. L., 165/20 Abbey Road, N.W.8. (Orn.)
1948 Collett, T. C., 6 Kent Avenue, Ealing, W.13. (Orn.)
1948 Collis, Miss M. M., Southlands College, 65 Wimbledon Parkside, S.W.19. (Ecol., Geol.)
1946 Colyer, C. N., F.I.A.C., F.R.E.S., 26 Ewart Grove, N.22. (Ecol., Ent., esp. Dipt.)
1914 Connoll, Miss E., 40 Ritherdon Road, S.W.17.
1948 Connolly-Brooks, Miss H., 65 Madrid Road, Barnes, S.W.13. (Bot.)
1948 Connolly-Brooks, Miss W., 101 Streathbourne Road, S.W.17. (Bot.)
1946 Connor, R. J., 79 Eastmead Avenue, Greenford, Middx. (Orn.)
1946 Conway-Morris, R., 2 Frognal Way, N.W.3. (Ent., Orn.)
1938 Cooper, J. M., Fairview, 48 Higher Drive, Purley, Surrey. (Orn.)
1942 Cramp, S., 9 Queen Court, Queen Square, W.C.1. (Ecol., Orn.)

1947 Cranston, R. W., B.Sc., c/o Mrs Bowher, 112 Fordbridge Road, Ashford, Middx. (Orn.)
1947 Craw, H. A., 30 Cranley Gardens, S.W.7. (Orn.)
1937 Crispin, G. H., Meadowcroft, Abbot's Langley, Herts.
1947 Croft, Mrs E. G., 1 Spencer House, Albion Avenue, S.W.8. (Orn.)
1948 Crook, Mrs V. M., "Wych," Dukes Avenue, Rayners Lane, North Harrow, Middx. (Orn.)
1927 Cross-Rose, F., 20 Woolstone Road, S.E.23. (Orn.)
1947 Crosthwaite, Miss A., 5 Foxley Hall, Higher Drive, Purley, Surrey. (Orn.)
1949 Crouch, E. L., 1a New Broadway, Hampton Hill, Middx. (Orn.)
1947 Cullen, J., Durley Lodge, Bickley Park Road, Bickley, Kent. (Orn.)
1892 Culpin, M., M.D., F.R.C.S., 17 Hatfield Road, St Albans, Herts. (Biol.)
1946 Cunha, Roy da, 2 Grove House, Epsom, Surrey. (Orn.)
1928 Cuningham, Miss D. W. M., c/o Mrs Lingard, Fellside, Windermere, Westmorland. (Bot., Ecol., Ent., Orn., Pl. G.)
1930 Cunningham, J., M.B.O.U., Fern Hill, Belfast. (Orn.)
1936 Currie, P. W. E., F.R.E.S., 102 Burdon Lane, Belmont, Sutton, Surrey. (Ecol., Ent., Orn.)
1946 Curtis, Miss M., 102 Philbeach Gardens, S.W.5. (Orn.)
1947 Dack, Miss Phyllis, 26 The Quadrangle, Herne Hill, S.E.24. (Bot., Orn.)
1936 Daffarn, J. D., 20 Woodside Avenue, Highgate, N.6. (Orn.)
1947 Dagger, The Rev. J. H. K., National Provincial Bank Ltd., Newport, Shropshire. (Temp. address, c/o Whitton Vicarage, Twickenham, Middx.) (Orn.)
1946 Dales, R. P., B.Sc., F.R.E.S., F.Z.S., 67 Westmoreland Avenue, Squirrels Heath, Essex. (Ecol., Ent., Orn.)
1920 *Dallas, J. E. S., 29 Clinton Road, Leatherhead, Surrey. (Arch., Bot., Ecol., Orn., Pl. G., R.)
1925 *Dallas, Mrs Rosa F., 29 Clinton Road, Leatherhead, Surrey. (Arch., Bot., Ecol., Geol., Orn., R.)
1940 Darlington, Miss I., M.A., 22 Addison Way, N.W.11. (Arch., Bot., Ecol., Orn.)
1933 Davies, Miss E. B., Graffham, Petworth, Sussex. (Ent., Orn.)
1944 Davies, Mrs I. W., 147 Coleherne Court, Redcliffe Gardens, S.W.5. (Bot., Orn.)
1945 Davies, S. H., 8 Crescent Parade, Hillingdon, Middx. (Orn.)
1946 Davis, A. G., F.G.S., 75 Croydon Road, Anerley, S.E.20. (Bot., Conch., Ecol., Ent., Geol.)
1948 Davis, Miss A. M., 125 Holbein House, S.W.1.
1932 Davis, Miss R., 118 College Road, S.E.21. (Orn., R.)
1949 Davis, Miss S. J., 73 Parkview Court, S.W.6. (Orn.)
1947 Dawson, Miss J. M., 19 Woodbourne Avenue, Streatham, S.W.16. (Orn.)
1948 Dawson, R. C., 36 Lancaster Road, Wimbledon, S.W.19. (Orn.)
1946 Day, P. R., 36 Templeton Avenue, Chingford, E.4. (Bot.)
1946 Deacon, Miss S., 157 Sussex Gardens, Paddington, W.2. (Orn.)
1926 Deane, Miss M. B. H., Box 36, B.P.O., Tangier, Morocco. (Orn.)
1910 Dell, F. G., 55 Russell Road, Buckhurst Hill, Essex. (Micr., Orn., P.L.)
1949 Delves, H. C., c/o W. R. Davidge & Partners, 5 Victoria Street, Westminster, S.W.1. (Arch., Geol.)
1947 Dermott, L. F., 26 Rockhampton Road, S.E.27. (Bot., esp. Mosses.)
1946 de Worms, Baron Charles G. M., 26 Common Close, Horsell, Woking, Surrey. (Lep., Orn.)
1945 Dickson, J. W. Address not known. (Bot., Photogr.)
1946 Dobbs, Miss L., 1 Fielding Road, Bedford Park, Chiswick, W.4. (Bot., Geol., Orn.)
1933 Doran, F. H., 14 Evelyn Mansions, Westminster, S.W.1. (P.L.)
1949 Doughty, W. C., 110 Priory Avenue, Chingford, E.4. (Orn.)
1928 Douglas-Smith, Miss K., 19 Thurlow Road, N.W.3. (Arch., Bot., Ecol., Orn.)
1946 Down, E. H., 28 Lynton Mead, Totteridge, N.20. (Orn.)
1946 Downe, Mrs J. H., Dormers, Challock, near Ashford, Kent.
1949 Drew, G. A., Carpoles, Stane Street, Ockley, Surrey. (Bot., Mam., Orn. Rep.)
1942 *Duffin, C. J., M.B.O.U., The Cottage, Lyncroft Gardens, Ewell, Surrey. (Bot., Ecol., Ent., Orn.)

1946 Dukes, Dr C., 1 Queen Anne Street, Cavendish Square, W.1. (Orn.)
1949 Dundas, Miss J., 35 Linden Gardens, W.2. (Geol., R.)
1948 Durrant, Miss G. H. T., 96c Westbourne Terrace, W.2. (Bot., Orn.)
1946 Eades, T. L., 8 Rossdale Road, Putney, S.W.15. (Arch., Bot., Geol., Orn.)
1944 Easton, A. M., M.B., B.S., Roadside Cottage, Lower Road, Great Bookham, Surrey. (Col.)
1945 Edwards, V. A., 75 Barn Hill, Wembley Park, Middx. (Ecol., Orn.)
1948 Elborn, Mrs E., 87 Brudenell Road, S.W.17. (Orn.)
1936 Elcome, G. D., 64 Syon Lane, Isleworth, Middx. (Orn.)
1946 Ellis, A. E., M.A., F.L.S., Epsom College, Surrey. (Bot., Chelifera, Isopoda, Mollusca, Odonata, Opiliones, Orth.)
1948 Ellis, S. E., B.Sc., British Museum (Natural History), Cromwell Road, S.W.7. (Geol.)
1936 Ellis, W. G., "Carisbrooke," 3 St Philip's Road, Surbiton, Surrey. (Geol., Orn.)
1939 Elphinstone, K. V., Artillery Mansions, S.W.1. (Orn.)
1946 Elworthy, Miss J. M., 54 Edith Road, W.14. At present abroad. Correspondence to Dr R. Elworthy, 18 St Margaret's Drive, E. Twickenham, Middx. (Bot., Orn.)
1933 England, Mrs B., 2 Langbourne Avenue, Highgate West Hill, N.6. (Orn., R.)
1947 England, M. D., Aros, Limpsfield, Surrey. (Orn.)
1947 English, A. E., 21 Aultone Way, Sutton, Surrey. (Bot., Orn.)
1927 English, Miss F., 8 Dorville Crescent, Ravenscourt Park, W.6. (Arch., Bot., Orn., R.)
1945 Entrican, Miss M. C., 12 Southwood Lane, Highgate, N.6. (Orn.)
1948 Evans, Rev. F. B., "Chipstone," 60 Selsdon Park Road, South Croydon, Surrey. (Orn.)
1937 Evans, H. J., B.Sc., Kenora, Loudham Road, Little Chalfont, Bucks. (Arch., Ecol., Geol., Orn.)
1942 Evans, L. R., c/o 35 Champion Grove, S.E.5. (Ecol , Orn.)
1946 Evans, Percy, M.A., F.G.S., 21 Grimsdyke Road, Hatch End, Middx. (Geol.)
1940 Fairbairn, D. C., M.C., M.B., B.Sc., L.R.C.P., M.R.C.S., 1 St Mary's Grove, Queen's Ride, S.W.13. (Bot.)
1949 Faraday, Miss A., 3 Ashdown Road, Epsom, Surrey.
1946 Farenden, Mrs J., 83 Harewood Road, Isleworth, Middx.
1946 Farenden, W., 83 Harewood Road, Isleworth, Middx. (Ecol.)
1946 Farmer, S., 80 Ferrymead Avenue, Greenford, Middx. (Orn.)
1939 Faulkner, Miss A. M. G., 127 Lower Richmond Road, S.W.14. (Arch., Orn., R.)
1949 Faulkner, Miss M. C. M., 127 Lower Richmond Road, Mortlake, S.W.14. (Arch.)
1947 Fieldhouse, J. R., 52 Sedgecombe Avenue, Kenton, Middx. (Orn.)
1948 Filshie, K., 34 Cartwright Gardens, W.C.1. (Orn.)
1944 Firth, F., "Normanhurst," 16 Winchelsey Rise, South Croydon, Surrey. (Orn.)
1944 Firth, F. M., "Normanhurst," 16 Winchelsey Rise, South Croydon, Surrey. (Orn.)
1948 Fisher, Miss D., 39 Comyn Road, Battersea, S.W.11. (Bot.)
1937 Fisher, J. M. McC., M.A., F.L.S., M.B.O.U., Old Rectory, Ashton, Northampton. (Ecol., Orn.)
1934 Fitter, R. S. R., B.Sc. (Econ.), F.Z.S., M.B.O.U., Greyhounds, Burford, Oxford. (Ecol., Ent., Orn.)
1947 Fitzpatrick, Mrs J M., 122 Castelnau, Barnes, S.W.13. (Bot., Ecol., Orn.)
1949 Fleming, Miss D. M., c/o Mrs Hammond, 18 Elm Tree Road, St John's Wood, N.W.8. (Orn.)
1948 Fletcher, R., 23 Denbigh Place, S.W.1. (Ent., Orn.)
1947 Fookes, Miss U., 71 St Mary's Mansions, Paddington, W.2. (Orn.)
1936 Forrester, Mrs C. E., Sesame Imperial and Pioneer Club, 49 Grosvenor Street, W.1. (Arch., Orn.)
1949 Forrester, J., 2 Albemarle, Parkside, Wimbledon Common, S.W.19. (Arch.)
1946 Forster, Miss E., 101 Hawkins House, Dolphin Square, S.W.1. (Bot., Orn.)
1937 Fossey, H. B., 49 Gloucester Place, W.1. (Orn.)
1924 Foster, J. B., B.A., 12 Conway Road, S.W.20. (Orn.)

1945 Foster, Miss K. E., 6 Criffel Avenue, Streatham Hill, S.W.2. (Bot., Ecol.)
1944 Fox, Prof. H. Munro, M.A., F.R.S., 27 Sussex Place, N.W.1. (Bot., Fr. Water Ecol., Geol., Orn.)
1948 Foxley, R. H., 13 Albemarle Avenue, Twickenham, Middx. (Geol.)
1947 Franghiadi, G. P., 6 Link Road, Rayleigh, Essex. (Lep.)
1938 Franks, Miss H., 262 South Norwood Hill, S.E.25. (Arch., Bot., Ecol., Orn., R.)
1931 Frederick, Miss L. M., M.Sc., F.Z.S., Whitelands College, West Hill, Putney, S.W.15. (Ecol., Orn., P.L., R.)
1949 Freeman, Mrs V. A. L., 30 Devonshire Place, W.1. (Orn.)
1948 French, Miss E. M., Queen Alexandra's House, Kensington Gore, S.W.7. (Ent., Orn.)
1935 French, W. A., Brookshill, Chigwell, Essex. (Bot., Orn.)
1947 Freshwater, D. V., 25 Princes Court, Shoot-up-Hill, N.W.2. (Orn.)
1948 Friedlein, W. A. L., 90 Minories, E.C.3. (Ent., Orn.)
1946 Frost, L. B., 55 St Albans Road, Woodford Green, Essex. (Ent.)
1948 Frostick, H. R., 92 Greencroft Road, Heston, Middx.
1945 Fudge, Miss E. M., 6 Pickhurst Rise, West Wickham, Kent. (Ecol.)
1946 Fulton, A. W., Little Saddlers, Eynsford, near Dartford, Kent. (Bot.)
1939 Garrett, V. R., M.A., M.B.O.U., 15 The Pryors, East Heath Road, N.W.3. (Ecol., Orn.)
1947 Garrett-Jones, C., Houseboat Hilara, c/o Rye House Farm, Hoddesdon, Herts. (Ecol., Ent.)
1949 Gascoigne, T., 14 York Grove, Peckham, S.E.15. (Biol.; Orn.)
1910 Gaze, W. E., 61 Handsworth Avenue, Highams Park, E.4. (Bot., Chem., Lep., Orn.)
1949 Gibbs, A., 20 Windsor Road, N.3. (Orn.)
1939 Gibson, Mrs G. M., 26 Gilston Road, S.W.10. (Bot., Orn.)
1948 Gill, Col. C. A., Wendover, Underhill Park Road, Reigate, Surrey. (Ent., Orn.)
1949 Gillanders, G., Peterhouse, Cambridge. (Geol.)
1931 Gillett, J. D., F.R.E.S., c/o The Medical Department, Entebbe, Uganda, British East Africa. (Ent., Rep.)
1933 Gillham, E. H., 19 Tennison Road, S.E.25. (Orn.)
1937 Gillingham, D. W., 28 Roding Road, Loughton, Essex. (Orn.)
1947 Gilmore, J. T., 67 White Hart Lane, Barnes, S.W.13. (Orn.)
1948 Gledhill, Miss E. J., 24 Wendover Road, Bromley, Kent. (Orn.)
1910 Glegg, W. E., F.Z.S., M.B.O.U., The Zoological Museum, Tring, Herts. (Orn.)
1945 Goldney, Mrs N., 30 Hylda Court, St Albans Road, N.W.5. (Bot., Orn.)
1946 Gollop, Charles, 40 Sandlands Road, Walton-on-the-Hill, Tadworth, Surrey. (Ent., Orn.)
1929 Goodfellow, Miss L., Flat 3, 7 Lyndhurst Gardens, N.W.3. (Orn.)
1947 Goodwin, D., "Toft," Monks Road, Virginia Water, Surrey. (Ecol., Orn.)
1939 Goom, Miss E. M., 78 Elmfield Avenue, Teddington, Middx. (Orn.)
1946 Goom, Miss N., 78 Elmfield Avenue, Teddington, Middx. (Orn.)
1947 Gordon, Miss W. G., 19 Broadlands Road, Highgate, N.6. (Orn.)
1948 Gore, G. C., 49 Eton Avenue, N.W.3. (Orn.)
1942 Gould, H. G., 35 Bergholt Avenue, Ilford, Essex. (Orn.)
1946 Graham, Miss E. D., 1 Beaumanor Mansions, 115 Queensway, W.2. (Bot., Orn.)
1947 Gray, C. A. M., 18 St John's Park, Blackheath, S.E.3. (Geol.)
1934 Gray, Miss J. W., 10 Canford Road, S.W.11. (Arch., Bot., R.)
1947 Gray, Mrs M. R., 18 St John's Park, Blackheath, S.E.3.
1927 Green, R., F.Z.S., Ruskin Studio, 7 New Court, Lincoln's Inn, W.C.2, and 84 Elgin Road, Seven Kings, Essex. (Orn.)
1948 Green, R. S. M., Wex Lodge, Portmore Park Road, Weybridge, Surrey. (Geol., Orn.)
1939 Greenfield, H. F., B.A., 44 Shepherd's Way, Rickmansworth, Herts. (Orn.)
1947 Greenfield, Mrs H. F., 44 Shepherd's Way, Rickmansworth, Herts. (Orn.)
1948 Greenfield, P., 18 Stuart Road, Warlingham, Surrey. (Bot., Orn.)
1899 *Greenwood, Prof. M., D.Sc., F.R.S., F.R.C.P., Hillcrest, Church Hill, Loughton, Essex. (Arch., Biol.)

1948 Grenham, R., 40 Elderton Road, Westcliff-on-Sea, Essex. (Bot.)
1945 Griffin, Mrs E. M., 1 Park Hall, Crooms Hill, Greenwich, S.E.10.
1947 Griffiths, Miss R. H., 19b Medway Street, S.W.1. (Arch., Bot., Orn.)
1945 Guildhall Library, E.C.2.

1949 Hains, Miss G. A., 76 The Avenue, West Ealing, W.13.
1927 *Hale, R. W., 6 Grendon Gardens, Wembley Park, Middx. (Arch., Bot., Ecol., Orn.)
1947 Hall, D. G., 34 Ellerton Road, Wandsworth Common, S.W.18. (Ent., Orn.)
1948 Hall, E. T. Court House Cottage, Winchelsea, Sussex. (Orn.)
1946 Hall, Dr Marjorie K., 16 Pilgrims Lane, Hampstead, N.W.3. (Orn.)
1949 Halse, Miss V., 11 Hanover Terrace, Regents Park, N.W.1. (Arch., Orn., R.)
1947 Hamilton, M. K., Anton House, Riching's Way, Iver, Bucks. (Orn.)
1948 Hammond, F. P., 34 Woodland Way, Mill Hill, N.W.7. (Orn.)
1944 Hammond, Miss Q., G.P.O. Hostel, Oakwood Court, W. Kensington, W.14. (Bot.)
1903 Hanbury, F., Capel, Westfield, Hoddesdon, Herts. (Lep.)
1927 Hardiman, Miss A., Hyron's Cottage, Woodside Road, Amersham, Bucks. (R.)
1921 Hardiman, J. P., C.B.E., B.A., Hyron's Cottage, Woodside Road, Amersham, Bucks. (Orn.)
1949 Hardwick, Miss K., 34 Asmuns Place, N.W.11.
1946 Hare, Miss P. E. F., B.Sc., 80 Coleman Court, S.W.18. (Bot., Geol., Orn.)
1949 Harris, H. C., 16 Wentworth Mansions, Keats Grove, Hampstead, N.W.3. (Bot., Ent.)
1949 Harris, K. G., 31 Broadfields Avenue, Winchmore Hill, N.21. (Orn.)
1942 Harris, L. F., 30 Ellis Avenue, Rainham, Essex. (Orn.)
1947 Harris, R. H., 179 Sirdar Road, Wood Green, N.22. (Ecol., Fr. Water Biol.)
1947 Harrison, C. J. O., 178 Mantilla Road, Tooting, S.W.17. (Orn.)
1943 Harrison, D. L., F.Z.S., Bowerwood House, St Botolph's Road, Sevenoaks, Kent (Biol., Orn.)
1946 Harrison, Miss G. M., B.Pharm., Ph.C., School of Pharmacy, 17 Bloomsbury Square, W.C.1. (Orn.)
1942 Harrison, Major J. L., A.R.C.S., M.Sc., F.R.E.S., Institute for Medical Research, Kuala Lumpur, Malaya. (Ecol., Ent.)
1947 Harrison, R. J., "Desswood," Sandy Lane, Cobham, Surrey. (Orn.)
1945 Hartridge, Miss M. R., 94 Canberra Road, Charlton, S.E.7. (Bot., Orn.)
1948 Harvey, Rev. B. F., 7 Hastings Avenue, Ilford, Essex. (Orn.)
1949 Haslam, C. C., 11 Windermere Road, Muswell Hill, N.10. (Orn.)
1946 Hasler, J. K., 12 Harman Drive, N.W.2. (Bot., Orn.)
1949 Hastings, W. R. C., 39 Russell Road, Buckhurst Hill, Essex. (Orn.)
1935 Hatch, R. S., 65 Marks Road, Hanwell, W.7. (Orn.)
1930 Haworth, Miss F. M., B.Sc., F.Z.S., Grove House, Roehampton Lane, S.W.15. (Bot., Zoo.)
1946 Hawtin, F., Ibstock Place School, Clarence Lane, S.W.15. (Orn.)
1947 Hayes, Miss D. L., 103 Knatchbull Road, S.E.5.
1947 Hayman, P. J., 120 Trinity Road, Southall, Middx. (Orn.)
1946 Hayman, R. W., "Timbers," 32a Hazlewell Road, Putney, S.W.15. (Mam., Orn.)
1927 Hayward, John F., Ph.D., M.Sc., F.G.S., 29 Mount Echo Drive, Chingford, E.4. (Biol., Geol.)
1946 Hearn, Miss D. B., 56 Meadvale Road, Ealing, W.5.
1946 Hepburn, Miss E. M., 6 Avenue Road, Teddington, Middx. (Orn.)
1948 Herbert, E. H., 8 Meadow Close, Sutton, Surrey. (Orn.)
1949 Herington, S. D., 8 Eton Villas, Hampstead, N.W.3. (Orn.)
1947 Hick, A. E., Sherrards, Cricketfield Lane, Bishop's Stortford, Herts. (Bot., Ent. (esp. Hym.), Photography, Pl. G.)
1948 Hicks, Miss E. D., 16 Rochester Way, Blackheath, S.E.3. (Orn.)
1946 Hicks, P. Yelverton, M.B., B.S., F.Z.S., Hayes Barton, Totteridge Lane, Totteridge, Herts. (Bot., Ent., Orn.)
1946 Hilbert, Miss G., 119 Ealing Village, Hanger Lane, W.5. (Bot.)
1946 Hill, F. L., 24 Westland Drive, Hayes, Bromley, Kent. (Bot., Lep., Orn.)
1946 Hill, H. M., 71 Ellison Road, Streatham, S.W.16. (Arch., Ecol.)

1948 Hillaby, J. D., F.Z.S., 1 Tanza Road, Hampstead Heath, N.W.3. (Ent., Geol.)
1946 Hillman, Miss E. M., 16 Exford Road, Grove Park, S.E.12. (Orn.)
1938 Hindson, M. T., 11 Holland Park, W.11. (Ecol., R.)
1949 Hodgson, R. C., 27 Tennyson Avenue, Motspur Park, New Malden, Surrey. (Orn., R.)
1946 Hodgson, Rev. R. L., 23 Howitt Road, Belsize Park, N.W.3. (Orn.)
1946 Hollings, Miss M., St Katharine's Training College, White Hart Lane, Tottenham, N.17.
1929 Hollom, P. A. D., Manor Cottage, Park Road, Woking, Surrey. (Orn.)
1949 Holme, H. C., 12 Upper Berkeley Street, W.1. (Orn.)
1947 Holmes, Miss A. M., Sunnyside, Shelley, Ongar, Essex.
1948 Holroyd, R., 152 Grand Drive, Raynes Park, S.W.20. (Orn.)
1944 Holroyde, F. J., 13 Denbridge Road, Bickley, Kent. (Orn.)
1947 Holroyde, R. B., 13 Denbridge Road, Bickley, Kent. (Orn.)
1948 Homes, Mrs D. E., 62d Albemarle Road, Beckenham, Kent. (Orn.)
1932 Homes, R. C., 62d Albemarle Road, Beckenham, Kent. (Ecol., Orn.)
1947 Hope, H. D. N., Highlands, Andover Road, Newbury, Berks. (Bot., Orn.) And at Guy's Hospital Medical School, S.E.1.
1944 Horeman, T. J., 104 Kilmorie Road, S.E.23. (Ent., Orn.)
1905 Hornblower, A. B., 91 Queen's Road, Buckhurst Hill, Essex. (Api., Arch., Ecol., Orn., R.)
1949 Horne, Miss H., 12 King's Crescent, N.4. (Geol., Orn.)
1948 Howe, G. A., "Denewood," Chestnut Close, Kingswood, Surrey.
1949 Howieson, Miss A. R., 11 Church Hill, Loughton, Essex. (Geol.)
1945 Howlett, V. G. A., 27 Barton Road, W.14. (Arch., Geol.)
1941 Hoy, K. E., 5 Beverley Crescent, Woodford Green, Essex. (Ent., Orn.)
1945 Hoyle, Miss D. M., 61 Danescroft, Brent Street, Hendon, N.W.4. (Ecol., Orn.)
1947 Hughes, C., 6 St Hilda's Avenue Ashford, Middx. (Orn.)
1947 Humphreys, P. N., address not known. (Orn., esp. Wild-fowl.)
1948 Hunter, E. N., Ely House, 90 Mount Ararat Road, Richmond, Surrey. (Orn.)
1938 Hurcomb, Sir Cyril, K.B.E., C.B., 47 Campden Hill Court, W.8. (Orn.)
1939 Hussey, N. W., c/o Penwarne, Stonewall Park Road, Langton, Tunbridge Wells, Kent. (Hym., Orn.)
1945 Hutchings, C. E., 38 Lancefield Street, Queen's Park, W.10. (Orn.)
1948 Hutchings, G. E., Juniper Hall Field Centre, Mickleham, Surrey.
1930 Hutton, Miss R. E., 34 Thorneyhedge Road, Gunnersbury, W.4. (Bot., Zoo.)
1947 Hyatt, K. H., 50 Heather Road, Grove Park, S.E.12. (Lep., Orn.)
1946 Inglis, Mrs G. I., 34 West Hill Court, Millfield Lane, N.6. (Orn.)
1948 Ingram, Miss C., Hearts Content, Dittisham, Dartmouth, Devon. (Bot.)
1945 Izzard, W. P., 180 Woodhouse Road, North Finchley, N.12. (Orn.)
1948 Jackson, Miss B. P., 171 Sutherland Avenue, W.9. (Bot.)
1948 James, L., 19 Bushey Road, Ickenham, Uxbridge, Middx. (Orn.)
1948 Jaques, Miss G. E., 58 Kenveachy Gardens, Charlton, S.E.7. (Bot., Ecol.)
1948 Jarrett, Miss S. M., 28 Dangan Road, Wanstead, E.11. (Ecol.)
1927 Jeffery, H. J., A.R.C.S., F.L.S., Tauranga, Cavell Avenue South, Peacehaven, Sussex. (Bot.)
1949 Jeffreys, Mrs A., 13 Cheyne Gardens, S.W.3. (Orn.)
1948 Jephson, Mrs P., 32 Queensberry Mews East, South Kensington, S.W.7. (Orn.)
1929 Johns, Miss F. E., 25 Ennismore Gardens, S.W.7. (Bot., Orn., R.)
1933 Johns, Miss L. J., 87 Morley Hill, Enfield, Middx. (Arch., Bot., Ecol., Orn., R.)
1946 Johnson, Miss E. E., 7 Links Road, Woodford Green, Essex. (R.)
1944 Johnson, P., F.Z.S., 53 Ennerdale Road, Richmond, Surrey. (Orn., Zoo.)
1948 Jolley, A. E., Olivers, Sewardstonebury, Chingford, Essex. (Orn.)
1949 Jones, Sir Clement, C.B., M.A., 415 Rodney House, Dolphin Square, S.W.1. (Arch., Orn.)
1947 Jones, D. G., 7 Cambrian Road, Richmond, Surrey. (Orn.)
1949 Jones, Lady Enid S., 415 Rodney House, Dolphin Square, S.W.1. (Arch., Orn.)
1939 Jones, H. O., Stonecliffe, Chalkhouse Green, near Reading, Berks. (Ecol., Orn.)

1947 Jones, M. W. Address not known. (Orn.)
1949 Jones, R. E., 68 Coleman Street, E.C.2. (Orn.)
1948 Jones, Miss V. B., 15 Friary Road, Friern Barnet, N.12. (Orn.)

1899 *Kaye, W. J., F.R.E.S., Chantrey Lodge, Longdown, Guildford, Surrey. (Lep.)
1945 Kelleway, Mrs D. M., 20 The Pryors, Hampstead, N.W.3. (Orn.)
1949 Kelsey, T. L., c/o 59a Chestnut Grove, South Ealing, W.5. (Orn.)
1946 Kemp, D. R., "The Priory," Knowle Green, Staines, Middx. (Bot.)
1945 Kennedy, Miss M. E., 62 Lordship Road, Stoke Newington, N.16. (Arch., Bot., Ent., Orn., R.)
1946 Kenrick, Miss Alison, 11 Pembridge Villas, W.11. (Orn.)
1944 Kent, D. H., 75 Adelaide Road, W. Ealing, W.13. (Bot., Chem., Ecol.)
1948 Kenyon, G. V., Rush Green Lodge, Hertford. (Orn.)
1947 Kerney, M., "Vasconia," Crown Dale, Upper Norwood, S.E.19. (Geol., Palaeontol.)
1934 Kerr, Mrs H. M. Rait-, 22 Elm Tree Road, N.W.8. (Arch., Ecol., Orn.)
1936 Keywood, K. P., Croft Cottage, Hare Lane, Claygate, Surrey. (Ecol., Ent., Orn.)
1948 Kidd, E., 1 Hill Crescent, Totteridge, N.20. (Orn.)
1929 King, E. L., 11 Downs View, Osterley, Middx. (Arch., Bot., Geol., Orn.)
1945 King, J. M. B., 23 Lyncroft Gardens, West Ealing, W.13. (Mycol.)
1932 King, Mrs O. T. G., 11 Downs View, Osterley, Middx. (Arch., Bot., Geol., Orn., R.)
1946 Knight, John, 74 East Sheen Avenue, East Sheen, S.W.14. (Orn.)
1946 Knipe, P. R., 24 Capthorne Avenue, Harrow, Middx. (Orn.)
1948 Knock, W. F., 11 Distillery Road, Brentford, Middx. (Orn.)
1947 Knott, Miss B. B., 12 Mount Echo Avenue, Chingford, E.4. (Orn.)

1947 Lake, Miss K. E., 5 Worsley Road, Hampstead, N.W.3. (Bot., Orn.)
1947 Lamb, Mrs M. E., 27 Barton Road, W.14.
1948 Lambert, Lt.-Col. H. M., O.B.E., Manor Cottage, Wimbledon Common, S.W.19.
1946 Landells, Dr J. W., 18 Balmoral Road, Worcester Park, Surrey. (Orn.)
1946 Landells, Mrs N., 18 Balmoral Road, Worcester Park, Surrey. (Orn.)
1948 Langham, Miss L. B., 7 Oak Hill Crescent, Woodford Green, Essex. (Orn.)
1949 Langston, H., 41 Oakdene Road, Sevenoaks, Kent. (Orn.)
1947 Lansbury, I., 50a Alston Road, Barnet, Herts. (Ent., Orn.)
1944 Larsen, R. T. F., 370, Finchley Road, N.W.3. (Orn.)
1945 Leatherdale, Mrs J., "Tasli," Hawks Hill, Leatherhead, Surrey. (R.).
1930 Ledlie, R. C. B., M.B., B.Sc., F.R.C.S., 177 Queen's Gate, S.W.7. (Bot., Orn.)
1946 Lee, H. Boswell, St Macra, Highland Road, Amersham, Bucks. (R.)
1946 Le Gros, A. E., Cowdray Lodge Hotel, Sussex Street, Winchester, Hants. (Arachnida, Ecol., Geol.)
1948 Leiper, Miss H. G., 31 Chivalry Road, S.W.11. (Bot., Orn., R.)
1947 Letts, J. K., 183 Windmill Lane, Greenford, Middx. (Bot., Fr. Water Biol.)
1946 Levy, Miss R. F., 28 New End, Hampstead, N.W.3. (Orn.)
1937 Lewer, F. A., Jalna, Cobham Road, E. Horsley, Surrey. (Orn.)
1946 Lewis, Miss E., 64 Quarry Park Road, Cheam, Surrey. (Bot., Orn.)
1948 Lewis, M., 13 Victoria Grove, W.8. (Orn.)
1919 Leyton Public Libraries (E. Sydney, F.L.A.), Central Library, E.10.
1946 Lightly, J. M. F., 6 Woodland Court, New Wanstead, E.11.
1949 Limmer, Miss A., 21 Alwyn Avenue, Chiswick, W.4. (Orn.)
1944 Lindley, K. A., 9 Old Oak Road, W.3. (Lep., Orn.)
1948 Lister, B., 37 Lower Camden, Chislehurst, Kent. (Geol.)
1926 *Littlejohn, H. A., F.Z.S., c/o A. Stent & Sons, Brockhampton Lane, Havant, Hants. (Bot., Ent., Orn.)
1947 Lloyd, G. W., 141 Pentonville Road, Finsbury, N.1. (Orn.)
1934 Locket, G. H., M.A., M.Sc., "The Copse," Grove Hill, Harrow-on-the-Hill, Middx. (Ecol., Ent.)
1944 Lockett, J. H., The Pines, Sheath Lane, Oxshott, Surrey. (Orn.)
1948 Lockett, Mrs M. E., 69 Norfolk Avenue, Sanderstead, Surrey. (Arch., Bot.)
1948 Lockett, T. H., 69 Norfolk Avenue, Sanderstead, Surrey. (Orn.)
1926 *Longfield, Miss C. E., F.R.G.S., F.Z.S., F.R.E.S, M.B.O.U., 11 Iverna Gardens, Kensington, W.8. (Bot., Ecol., Ent., Orn., R.)

1945 Longley, C. W., Lloyds Bank House, 40a Rosslyn Hill, Hampstead, N.W.3. (Bot., Orn.)
1945 Longley, Mrs S. H., Lloyds Bank House, 40a Rosslyn Hill, Hampstead, N.W.3. (Bot.)
1948 Lory, R., 17 Cranley Gardens, S.W.7. (Arch., Orn.)
1936 Lousley, J. E., 7 Penistone Road, S.W.16. (Bot., Ecol., Orn.)
1930 *Low, G. Carmichael M.A., M.D., F.R.C.P., F.Z.S., M.B.O.U., 7 Kent House, Kensington Court, W.8. (Orn., Zoo.)
1926 Lutwyche, Mrs A. N., 120 Mildred Avenue, Watford, Herts. (Orn., R.)
1946 Lutwyche, Miss V. U., 24 Well Walk, Hampstead, N.W.3. (Orn.)
1938 MacAlister, D. A., 10 St Albans Grove, Kensington, W.8. (Orn.)
1928 MacAlister, Mrs E., 10 St Albans Grove, Kensington, W.8 (Bot., Orn.)
1937 *McClintock, Major D., M.A., A.C.A., Bracken Hill, Platt, near Sevenoaks, Kent. (Bot., Orn.)
1935 McCulloch, Lt.-Col. G. K., c/o 65 Chester Road, Northwood, Middx. (Orn.)
1933 MacDonald, Rt. Hon. Malcolm J., The Commissioner-General's Residence, Bukit Serene, Johore Bahru, Malaya. (Orn.)
1935 McDowell, Miss C. M., 19 Cambridge Park Court, E. Twickenham, Mx. (Bot., Orn., R.)
1939 McEwen, Miss E., 230 Kensington Close, Wrights Lane, W.8. (Orn.)
1945 McHoul, J., 76 Princes Court, Brompton Road, S.W.3. (Orn.)
1911 MacIntosh, Miss I. S., 3 Mayfield Road, E.4. (Arch., Bot.)
1911 MacIntosh, Miss J. D., 3 Mayfield Road, E.4. (Arch., Bot.)
1929 Mackay, Helen M. M., M.D., F.R.C.P., 7 Lyndhurst Gardens, N.W.3. (Orn.)
1946 Mackie, J. D. H., 13 Southfields, Rochester, Kent. (Orn.)
1948 Mackintosh, D. R., Oakwood, Bayley's Hill, Sevenoaks, Kent. (Orn.)
1946 Mackintosh, W., 6 Enmore Road, S.W.15. (Arch., Biol., Bot., Ecol., P.L.)
1932 Mackworth-Praed, C. W., F.R.G.S., F.Z.S., F.R.E.S., M.B.O.U., Castletop, Burley near Ringwood, Hants. (Ent., Orn.)
1948 McLeish, Miss G., M.Sc., 19 Gunnersbury Court, Bollo Lane, W.3. (Ecol., Ent., Orn.)
1949 McMeeking, 2nd/Lt. J. M., Officers' Mess, War Office Signal Regiment, Richmond Park Camp, Kingston-on-Thames, Surrey. (Orn.)
1943 McNicol, G. F., 38 King's Road, Edmonton, N.18. (Bot., Orn.)
1943 McNicol, Mrs J. C., 38 King's Road, Edmonton, N.18. (Bot., Orn.)
1923 *Macpherson, A. Holte, B.C.L., M.A., F.Z.S., 12 The Beacon, Exmouth, Devon. (Orn.)
1948 MacPherson, A. H., Grange Cottage, Rushmore Hill, Farnborough, Kent. (Orn.)
1946 Macpherson, Miss A. Margaret C., M.D., F.R.C.P., 22 Well Walk, Hampstead, N.W.3. (Orn.)
1947 Maitland, Mrs M. A., 151 Coleherne Court, S.W.5. (Bot., Orn.)
1923 Mann, E., 10 Frankland Road, E.4. (Ecol., Orn., P.L.)
1934 Mann, F. R., M.C., Noreena, Ham Common, Surrey. (Orn.)
1934 Manser, G. E., 279 Clockhouse Road, Beckenham, Kent. (Bot., Ecol., Orn.)
1934 *Marchant, Miss R., 24 Longmeads, Rusthall, Tunbridge Wells, Kent. (Arch., Bot.)
1944 Mason, Mrs U. C., 63 King's Road, Richmond, Surrey. (Bot., Mycol.)
1948 Mather, D. H., 45 Hawke Road, S.E.19. (Orn.)
1940 Mayo, R. W., Inaspinney, Oaklands, Welwyn, Herts. (Orn.)
1943 Mears, R. G., 14 Hampton Road, E.4. (Ent.)
1949 Medhurst, H. P., 43 Gowrie Road, Lavender Hill, S.W.11. (Orn.)
1947 Melluish, Mrs M. L., 56 Sunnyfield, Mill Hill, N.W.7. (Orn.)
1935 Melluish, W. D., 56 Sunnyfield, N.W.7. (Arch., Ecol., Orn.)
1947 Melville, K. J., 25 Lyncroft Gardens, N.W.6. (Arch., Orn.)
1946 Mercer, G. I., Flat 7, 23 Powis Square, Kensington, W.11. (Orn.)
1949 Meyer, C. M., A.M.I.Struct.E., 87 Norfolk House, Regency Street, Westminster, S.W.1. Arch., Geol.)
1948 Middleton, Miss G. E., 435a Chertsey Road, Twickenham, Middx. (Ecol., Ent., Orn.)
1948 Miller, Miss J., 19 Woodbourne Avenue, Streatham, S.W.16. (Orn.)
1948 Miller, O. L., 52a Princes Square, W.2. (Orn.)

1944 Mills, T. H. L., A.I.E.E., 82 Madrid Road, S.W.13. (Orn.)
1949 Milne, Miss A. M., 51 Lansdowne Road, W.11. (Arch., R.)
1947 Milne-Redhead, E., 7 Ashley Gardens, Petersham, Richmond, Surrey. (Bot., Ent., Orn.)
1946 Mitchell, F. J. L., 298 Latymer Court, W.6. (Orn.)
1932 Mitchell, Miss M. I., 7 Penwerris Avenue, Osterley, Middlesex. (Bot., Orn.)
1949 Mitchell, W. N., 24 Townsend Road, Southall, Middx. (Orn.)
1949 Mollison, Mrs W. M., 23 Devonshire Place, W.1. (Orn.)
1949 Monk-Jones, A., 44 Gerard Road, Barnes, S.W.13. (Orn.)
1946 Montgomery, B. K., address not known. (Orn.)
1946 Montieth, Mother M., Convent of the Sacred Heart, 28 West Hill, S.W.18.
1948 Moody, R. F., 2 Sunnyside Cottages, High Street, Harlington, Middx. (Orn.)
1947 Moore, D. R., Sunnydell Cottage, Westcar Lane, Hersham, Surrey. (Ent. (esp. Rhopalocera, Sphinges), Orn.)
1948 Moore, F. Littlewood, The Studio, 3 Woodfield Way, Bounds Green Road, N.11. (Orn.)
1948 Moore, G. W., 1 Darby Crescent, Sunbury-on-Thames, Middx.
1947 Moore, G. W. R., Sunnydell Cottage, Westcar Lane, Hersham, Surrey. (Orn.)
1948 Moore, Commander H. H. R., R.N., United Service Club, Pall Mall, S.W.1. (Orn.)
1948 Moore, Mrs M. M., The Studio, 3 Woodfield Way, Bounds Green Road, N.11. (Orn.)
1947 Moorman, R. F., 56 Oxford Road, Carshalton, Surrey. (Geol.)
1947 Morgan, Miss B. M. C., B.A., Braeside, Horley, Surrey. (Bot.)
1946 Morgan, E. W. A., Wandle Cottage, Meadow Road, Sutton, Surrey. (Bot., Orn.)
1948 Morgan, Dr H. V., The Dunn Laboratory, St Bartholomew's Hospital, E.C.1. (Orn.)
1949 Morison, Dr G. D., 4 Granville Place, Aberdeen, or Entomological Department, North of Scotland College of Agriculture, Marischal College, Aberdeen. (Econ., Ent., Thysanoptera.)
1947 Mortimer, T. J., 24 Highfield Drive, West Wickham, Kent. (Ent., Orn.)
1949 Morton, Miss M., 57 Elsham Road, W.14. (Orn.)
1942 Mugele, G. F., 6 Mansfield Hill, Chingford, E.4.
1945 Muir-Wood, Miss H. M., D.Sc., 4 Gliddon Road, Barons Court, W.14. (Bot., Orn.)
1934 Munro, Miss M., 50a Hendham Road, Trinity Road, S.W.17. (Ecol., Orn.)
1947 Murphy, James, 184 Tottenham Lane, N.8. (Orn.)
1949 Murray, H., "Bracken," Cornsland, Brentwood, Essex. (Orn.)
1937 Musselwhite, D. W., Treryn, Frith Hill, Godalming, Surrey. (Orn.)
1938 *Myers, A. F., 43 Arkwright Road, N.W.3. (Orn.)
1936 Napper, Major R. P., R.A., F.Z.S., 24 Vernon Road, East Sheen, S.W.14. (Orn.)
1946 Nash Miss B. M., 105 Station Road, Hendon, N.W.4. (Bot., Mycol., Orn.)
1948 Nattrass, F. A., 121 Hornsey Lane, N.6. (Orn.)
1949 Needham, Miss V. A., 112 Lonsdale Avenue, Wembley, Middx.
1947 Nelmes, Miss E. M., 27 Westbourne Avenue, Acton, W.3. (Ecol.)
1946 Newbery, D. A., 41 Courtfield Rise, West Wickham, Kent. (Bot., Ecol., Geol., Orn.)
1949 Newbury, R. D. A., 7 The Knoll, Beckenham, Kent. (Orn.)
1946 Newton, Dr R. G., 4 Walden Road, Welwyn Garden City, Herts. (Ecol., Orn.)
1926 Niblett, M., 10 Greenway, Wallington, Surrey. (Ent., Pl. G.)
1949 Nicholls, E. H., 27 St George's Road, Forty Hill, Enfield, Middx. (Orn.)
1893 *Nicholson, Miss B., 49 Danecourt Road, Parkstone, Dorset. (Bot.)
1934 Nicholson, E. M., C.B., M.B.O.U., 13 Upper Cheyne Row, S.W.3. (Ecol., Orn.)
1949 Nicholson, Miss P. J., 32 Thurleigh Road, S.W.12. (Orn., Water Biol.)
1946 Noel, A. S., 42 Redbridge Lane, Ilford, Essex. (Bot., Ent., Orn.)
1946 Noel, Miss D., 32 Parkhill Road, N.W.3.
1949 Nordal, T. G., 9 Twyford Avenue, Acton Hill, W.3. (Orn.)
1946 Norkett, A. H., 96 The Street, Fetcham, Surrey. (Bot., Ecol.)
1940 Norsworthy, H. H., 8 Balliol House, Manor Fields, S.W.15. (Orn.)

1949 Odlum, W. P., " Durlstone Manor," Champion Hill, S.E.5. (Orn.)
1947 Ogier, R. L., 60 Great Cumberland Place, W.1. (Arch., Geol., R.)
1945 O'Neil, Mrs H. E., F.S.A., 32 Blomfield Road, W.9. (Arch., Orn.)
1937 Owen, C. E., Haslemere Educational Museum, Haslemere, Surrey. (Orn.)
1947 Owen, D. F., 3 Lockmead Road, Lewisham, S.E.13. (Lep., Orn.)
1946 Owen, Mrs E. K., 30 Hamilton Road, Harrow, Middx.
1938 Paddington Public Libraries (H. J. W. Wilson, A.L.A.), Porchester Road, W.2.
1946 Page, W. M., C.B.E., M.A., F.R.A.S., 16 Lansdowne Road, Wimbledon, S.W.20. (Orn.)
1946 Page, Mrs W. M., 16 Lansdowne Road, Wimbledon, S.W.20. (Orn.)
1944 Panchen, A. L., 21 Rowan Road, S.W.16. (Ent., Rep.)
1947 Parish, E. L., Oak Tree Cottage, Hillcrest Gardens, Hinchley Wood, Esher, Surrey. (Orn.)
1946 Park, Mrs J. M. M., 15a Cargreen Road, South Norwood, S.E.25. (Orn.)
1948 Park, V. C., 15a Cargreen Road, South Norwood, S.E.25. (Orn.)
1938 Park, W. D., c/o 34 White Horse Drive, Epsom, Surrey. (Ecol., Orn.)
1946 Parmenter, Miss B. M., 94 Fairlands Avenue, Thornton Heath, Surrey. (Biol.)
1925 *Parmenter, L., F.R.E.S., 94 Fairlands Avenue, Thornton Heath, Surrey. (Bot., Ecol., Ent. (esp. Dipt.), Orn., Pl. G.)
1948 Parr, D., " Bemerton," Hillbrow Road, Esher, Surrey. (Orn.)
1938 Parrinder, E. R., 27 Gwalior House, Chase Road, N.14. (Ecol., Orn., R.)
1938 Parrinder, Mrs E. R., 27 Gwalior House, Chase Road, N.14. (Ecol., Orn., R.)
1947 Parry, P. E., 190 Bickenhall Mansions, Gloucester Place, W.1. (Ent., Orn.)
1945 Parsons, C. H. F., 37 Court Farm Road, Northolt, Greenford, Middx. (Orn.)
1946 Patey, D. H., 11 Meadway Close, N.W.11. (Orn.)
1946 Pattinson, Miss S. V., 140 Forest Hill Road, Honor Oak, S.E.23.
1949 Pattison, J. R., 37 Disraeli Road, Ealing, W.5. (Orn.)
1933 Paulson, C. W. G., M.B.O.U., F.Z.S., c/o Monotype Corporation Ltd., Salfords, Redhill, Surrey. (Arch., Orn.)
1923 Payne, E. M., Tilgate, Long Lane, Hillingdon, Middlesex. (Bot., Orn.)
1942 *Payne, R. M., 46 Florence Road, Sanderstead, Surrey. (Bot., Ecol., Ent.)
1948 Payne, R. W., 21 Norfolk Road, St John's Wood, N.W.8. (Orn.)
1944 Payton, H. W., Lianda, Hill Close, Harrow, Middx. (Arch., Bot., Orn.)
1947 Peacock, Miss J. L., 65 Aylward Road, Merton Park, S.W.20. (Orn.)
1937 Pearce, E. W., 3 Berkeley House, Hampton, Middx. (Orn.)
1935 Pearse, B. S. K., 57 Norfolk Road, Seven Kings, Essex. (Bot., Ent., Orn.)
1946 Pearton, J. E., 90 Wentworth Road, Barnet, Herts. (Ent., Mam.)
1948 Peck, Miss J. E., 39 Church Vale, East Finchley, N.2. (Orn.)
1932 Pedler, E. G., 100 East Sheen Avenue, S.W.14. (Orn., R.)
1945 Pegram, D. C., 44 Combemartin Road, S.W.18. (Ecol., Orn.)
1946 Perkins, Mrs V., 53 Rectory Road, E.17. (Orn.)
1948 Perks, F., 92 Ebury Street, S.W.1.
1948 Perks, Mrs M. E., 92 Ebury Street, S.W.1.
1948 Perry, Miss E., 69 Burnfoot Avenue, Fulham, S.W.6. (Bot., Orn.)
1949 Perry, J., 90 Villiers Road, Willesden Green, N.W.2. (Orn.)
1937 Peterken, J. H. G., F.L.S., 73 Forest Drive East, E.11. (Bot., Ecol., Geol., Orn.)
1937 Philipson, W. R., B.A., Ph.D., F.L.S., 33 Park Avenue, Ruislip, Middlesex. (Orn.)
1949 Phillips, D. R., 10 Colne Road, Winchmore Hill, N.21. (Arch.)
1949 Phillips, Miss G., 31 Green Lane, Hendon, N.W.4. (Orn.)
1947 Phillips, J. D., Selworthy, Springfield Gardens, Upminster, Essex. (Orn.)
1944 Phillips, R., 1 Scutari Road. S.E.22. (Orn.)
1937 Piercy, K., Clifton Cottage, Clifton, Beds.
1943 Pilcher, Miss E. V., 65 Chester Road, Northwood, Middx. (Bot.)
1949 Pilkington, R. C. L., Little Farnham, Ware, Herts. (Orn.)
1947 Pinchin, Miss E. M. S., 10 Iverna Court, Kensington, W.8. (Orn.)
1931 Pinniger, E. B., F.R.E.S., 5 Endlebury Road, E.4. (Ecol., Ent., Orn., R.)
1927 Piper, Miss G. E. M., 12 Elms Road, Clapham, S.W.4. (Orn.)
1941 Pitt, Miss Frances, The Albynes, Bridgnorth, Salop. (Orn.)
1949 Platt, Miss A. H., 9 Swan Studios, 69 Deodar Road, Putney, S.W.15.

1949 Platt, J., 9 Swan Studios, 69 Deodar Road, Putney, S.W.15. (Orn.)
1949 Platt, Miss M. H., Clipstone, Gloucester Road, Kingston Hill, Surrey. (Orn.)
1925 Poock, S. G., 65 Milton Road, Harpenden, Herts. (Api., Ecol., Orn.)
1933 Popple, Miss W. N., Castle Rise, Castle Hill Avenue, Berkhamsted, Herts. (Ecol., Orn., P.L., R.)
1946 Porter, Miss B. M. M., Moat Villa, Gt. Oakley, Harwich, Essex. Temporary address—74 Hulse Avenue, Barking. (Bot., Orn.)
1947 Powell, Miss B. M., Grove House, Roehampton Lane, S.W.15. (Orn.)
1944 Prall, D. I. F., 15 Cornwall Terrace Mews, Regent's Park, N.W.1. (Orn.)
1948 Pratt, H. M., Stone House, near Dartford, Kent. (Bot.)
1949 Price, Miss K. E., 120 Cromwell Road, S.W.7. (Orn.)
1943 Priestley, Mrs J. B., O.B.E., B3 Albany, Piccadilly, W.1. (Orn.)
1946 Proctor, Miss H. G., Bedford College for Women, Regent's Park, N.W.1.
1946 Pullom, E. N., 34 Victoria Avenue, Surbiton, Surrey. (Arch., Orn.)
1945 Purdom, Mrs I., 14 Larkshall Crescent, Chingford, E.4.
1946 Pyle, F/O. M. A., 66 Gracefield Gardens, Streatham, S.W.16. (Orn.)
1949 Quilter, B S., 19 Whitehouse Way, Southgate, N.14. (Orn.)
1947 Radford, Miss O., 3 Acland Crescent, Denmark Hill, S.E.5. (Mycol.)
1949 Radcliffe, Miss I., 8 Elm Row, Hampstead, N.W.3. (Orn.)
1946 Raines, R. J., Oakdale Hotel, Nottingham. (Orn.)
1943 Ralls, C. W., Green Court, 58 Queen's Road, Richmond, Surrey. (Orn.)
1939 Rammell, Mrs E. M., Kingsbury Lodge, St Albans, Herts. (Orn.)
1945 Ramsden, Miss D. H., 33a Belfield Road, Didsbury, Manchester, 20.
1949 Rand, Miss B., Southolme, Waterlow Road, Reigate, Surrey. (Orn.)
1934 Ratcliff, P. W., "Redlands," Middle Street, Brockham, Surrey. (Bot., Ecol., Orn.)
1938 Rawlence, D. A., Hill Top Cottage, Warboys Road, Kingston Hill, Surrey. (Orn.)
1934 *Ray, Miss T., 24 Longmeads, Rusthall, Tunbridge Wells. (Arch., Bot.)
1945 Raynham, Miss M., 36 Villiers Avenue, Surbiton, Surrey. (Orn.)
1947 Reed, J., 41 Freegrove Road, N.7. (Mycol.)
1948 Reed, Miss M. W., 40 Ringstead Road, Catford, S.E.6. (Geol., Orn.)
1930 Reeve, Miss E. A., The Penn Club, 22 Bedford Place, W.C.1. (Bot., Ecol., Ent., Orn., R.)
1946 Regan, Miss M. G., 71a Deodar Road, Putney, S.W.15. (Bot., Orn.)
1949 Reuby, M. J., 49 Priory Crescent, North Cheam, Surrey.
1943 Richards, B. A., 29b St John's Avenue, S.W.15. (Orn.)
1925 Richardson, A., 2 Manor Road, Wheathampstead, Herts. (Ent., Orn.)
1948 Richardson, A. E., 391 Malden Road, Worcester Park, Surrey. (Lep.)
1948 Richardson, H. L., Ph.D., Imperial Chemical Industries Ltd., Central Agricultural Control, 12 Upper Belgrave Street, S.W.1. (Orn.)
1948 Ridpath, M. G., Tynings, Cobden Hill, Radlett, Herts. (Orn.)
1946 Ringer, Miss G. M., 193 Holly Lodge Mansions, Highgate, N.6.
1943 Rivers, Major J. S., R.A.M.C., The Cottage, Oxshott Way, Cobham, Surrey. (Orn.)
1934 Roberts, J. E., B.Sc., Homewood, Kelsall, Cheshire. (Ecol., Orn.)
1946 Robins, W. A., 27 Spencer Road, Chiswick, W.4. (Orn.)
1947 Robinson, Miss A., G1 Sloane Avenue Mansions, S.W.3.
1940 Robinson, T. R., Flat 10, Linton House, Holland Park Avenue, W.11. (Orn.)
1948 Rogers, Miss R. M., 73 Mayfield Road, Hornsey, N.8. (Bot., Ecol., Ent., Orn., R.)
1938 Rommel, Miss D., The Orchard House, Bickley, Kent. (Arch., Orn.)
1949 Rook, Miss D. A., 55 Chesterfield Road, West Ewell, Surrey. (Orn.)
1937 Rose, C. C., 18 Draycott Avenue, Kenton, Middx. (Orn.)
1944 Rosenberg, R. Address not known. (Mycol.)
1910 *Ross, J., 23 College Gardens, E.4. (Pl. G.)
1943 Round, E. A., 63 Mayfield Road, E.4. (Ecol., Geol.)
1947 Rudd, H. W., M.Sc., F.R.I.C., 19 Ormonde Rise, Buckhurst Hill, Essex. (Orn.)
1947 Rumbold, T. A., 9 Drax Avenue, Wimbledon, S.W.20. (Orn.)
1946 Russell, The Hon. Mrs Leo, Park House, Pelham Street, S.W.7. (Orn.)
1948 Russell, Capt. S. J. C., 31 Albert Mansions, S.W.11. (Orn.)
1941 Rutherford, Mrs P., 82 Southgate Road, Potters Bar, Middlesex. (Orn.)

1942 *Ryall, R. H. M., 24 Stilecroft Gardens, Wembley, Middx. (Orn.)
1946 Ryall, Mrs R. H. M., 24 Stilecroft Gardens, Wembley, Middlesex. (Orn.)
1949 Sabin, Miss D. M., 27 Langbourne Avenue, N.6. (Orn.)
1948 Sage, B. L., 138 Fitzjohn Avenue, High Barnet, Herts. (Orn.)
1948 Salter, S. C. M., 50 Pinewood Avenue, New Haw, Weybridge, Surrey. (Orn.)
1929 Sampson, E. S., 60 Alexandra Road, Epsom, Surrey. (Orn.)
1946 Sanday, Miss M. G., 12 Albion Road, Sutton, Surrey. (Orn.)
1949 Sander, Miss H. K., 6 Nassington Road, Hampstead, N.W.3. (Orn.)
1946 Sanderson, G. E., 29 Fielding Avenue, Twickenham, Middx. (Ent., Orn.)
1947 Saunders, W. H , 18 Herne Hill, S.E.24. (Orn.)
1946 Sawyer, Mrs K., 44 Colwyn Crescent, Hounslow, Middx. (Bot.)
1948 Schofield, Miss G. E., 135 Hainault Road, Leytonstone, E.11.
1946 Scholey, Miss M. A. R. S., Flat 29, 20 Stuart Crescent, Wood Green, N.22. (Bot., Ecol., Ent., Geol., Orn.)
1937 Scott, Miss E. M. P., 7 Broomfield Road, Kew Gardens, Surrey. (Arch., Orn.)
1947 Scott, Peter M., M.B.E., D.S.C., M.A., F.Z.S., New Grounds, Slimbridge, Gloucestershire. (Orn.)
1947 Sellers, Miss J., 12 Cranes Park Avenue, Surbiton, Surrey.
1948 Sellick, G., Highgate School, N.6. (Ent.)
1949 Seth-Smith, D. W., M.R.C.S., L.R.C.P., 11 Stanford Court, Cornwall Gardens, S.W.7. (Orn.)
1946 Seys, J. A., address not known. (Orn.)
1945 Shaw, Miss M. B., 5a Old Town, Clapham, S.W.4.
1949 Shaw, R. G., 5 Burnham Road, Chingford, E.4. (Lep.)
1948 Shea, H. A. W., 15 Birchwood Court, Edgware, Middx. (Bot.)
1948 Sheppard, Miss J., 42 Queen's Road, Richmond, Surrey. (Orn.)
1948 Shilcock, Miss J. R., Saxby, Ham, Surrey. (Bot., Orn.)
1935 Shill, W. A., Barberries, Greenhurst Lane, Oxted, Surrey. (Bot.)
1947 Shillito, J. F., B.Sc., 28 Roebuck Lane, Buckhurst Hill, Essex. (Ecol., Ent.)
1929 Short, G. R. A., F.L.S., 36 Parkside Drive, Edgware, Middlesex. (Bot., Ecol., Micr., Pharmacognosy.)
1943 Siebert, W. F., Lakeside, Appledram, Chichester, Sussex. (Orn.)
1892 Simes, J. A., O.B.E., F.R.E.S., 75 Queen's Road, Loughton, Essex. (Ent.)
1946 Simister, J. M., 56 Chase Way, Southgate, N.14. (Ecol., Orn.)
1946 Simmonds, P. E. L., 30 Westmere Drive, N.W.7. (Ecol., Orn.)
1943 Simmons, G. W., Town Close, 14 Millway, Mill Hill, N.W.7.
1945 Simons, Mrs N. C. B., 30 Hill Top, Hampstead Garden Suburb, N.W.11. (Orn.)
1949 Simpson, Miss D., Headley, Mount Ararat Road, Richmond, Surrey. (Bot.)
1949 Simpson, L. S., 9 Woodland Gardens, Muswell Hill, N.10.
1947 Sims, C. G., River Plate House, 13 South Place, E.C.2.
1945 Singleton, H. G. H., 29 Decoy Avenue, Golders Green, N.W.11. (Arch., Geol., Orn., R.)
1945 Singleton, S. H., 56 Harrowes Meade, Edgware, Middx. (Bot., Orn.)
1948 Skeggs, R. L. D., 24 Kemplay Road, Hampstead, N.W.3. (Orn.)
1948 Skibicki, J., 16 Champion Grove, Denmark Hill, S.E.5. (Bot., Ecol., Ent., Orn.)
1946 Skirving, Miss I. S., Flat 38, 29 Abercorn Place, N.W.8. (Orn.)
1933 Skrimshire, E. H. N., F.R.A.I., F.Z.S., 5 Old Well House, N.6. (Arch., Orn., R.)
1949 Slocombe, N. R., 10 Heath Drive, N.W.3. (Arch., Orn.)
1947 Smart, Miss J. M., 15 Hepworth Road, Streatham, S.W.16. (Bot., Ecol.)
1949 Smith, Alec, Entomology Department, London School of Hygiene, Keppel Street, W.C.1. (Ecol., Ent., esp. Dipt.)
1947 Smith, Miss A. C., 6 Ladbroke Road, Bush Hill Park, Enfield, Middx.
1946 Smith, A. H. V., 96 Berkshire Gardens, Palmers Green, N.13. (Bot., Ecol., Orn.)
1944 Smith, D. C., 20 Carlton Avenue, Kenton, Middx. (Orn.)
1947 Smith, Frederick W., Boreland of Southwick, by Dumfries. (Lep.)
1929 Smith, Mrs H. K., 103 Wood Vale, N.10.
1948 Smith, Irvine B., M.A., M.B., West Middlesex County Hospital, Isleworth, Middx. (Orn.)

1937 Smith, Malcolm A., M.R.C.S., L.R.C.P., F.Z.S., Branksome, Old Woking Road, Pyrford, Surrey. (Amph., Rep.)
1947 Smith, P. R., Sunnyways, Acrefield, Gerrards Cross, Bucks. (Ent.)
1927 *Solly, Miss B. N., 167 Old Brompton Road, S.W.5. (Orn.)
1948 Songhurst, Miss M., 102 Langham Court, S.W.20. (Bot., Orn., R.)
1946 Souter, Miss Eileen, 12 Mount Carmel Chambers, Dukes Lane, W.8. (Orn.)
1946 Souter, Miss Pamela, 12 Mount Carmel Chambers, Dukes Lane, W.8. (Orn.)
1948 Southwick, Miss E. W., 74 Nathan's Road, North Wembley, Middx. (Plant Ecol.)
1948 Spencer, K., 101 Gladstone Road, Wimbledon, S.W.19. (Orn.)
1946 Spencer, K. J., 16 Priestlands Park Road, Sidcup, Kent. (Orn.)
1944 Spencer, P. J., 12 The Pryors, E. Heath Road, N.W.3. (Orn.)
1922 Spooner, H., 21 Musgrave Crescent, S.W.6. (Arch., Bot., Ecol., Geol., Orn., R.)
1944 Spreadbury, W. H., 35 Acacia Grove, New Malden, Surrey. (Ecol.)
1948 Springett, Miss K. E., 26 Retcar Street, Highgate, N.19. (Bot., Orn., R.)
1944 Spurway, Miss H., Ph.D., Department of Biometry, University College, W.C.1. (Herpetology, Zoo.)
1949 Staines, Miss V. A., 23 Clifton Road, Finchley, N.3.
1946 Stanton, Miss H., 63 Park Road, Hampton Hill, Middx. (Orn.)
1945 Steele, B., 15 Sydney Road, Teddington, Middx. (Bot., Ecol.)
1949 Stock, Miss M. H., 26 Hillcrest Road, Acton Hill, W.3. (Arch., Orn.)
1946 Stokes, Miss I. K., 32 Ventnor Gardens, Barking, Essex.
1920 *Stowell, H. S., L.R.I.B.A., Pirbright, Torland Road, Hartley, Plymouth. (Arch.)
1949 Straschil, Miss M., 6 Southside, Austenwood Common, Chalfort St Peter, Bucks. (Arch., Bot., Orn.)
1945 Stronge, R. J. T., 100 The Chase, Wallington, Surrey. (Ent., Mycol.)
1949 Studd, Miss P. D. M., 53 Lattice Avenue, Ipswich, Suffolk. (Bot.)
1945 Sturrock, W. D., 17 Woodside Close, Tolworth, Surbiton, Surrey.
1948 Summers, D. J., 71 Rugby Road, Dagenham, Essex. (Orn.)
1949 Sylverton, H., 30 Milton Avenue, Sutton, Surrey. (Arch., Ent., Orn.)
1944 Syms, E. E., F.R.E.S., 22 Woodlands Avenue, E.11. (Ent.)
1948 Tabori, P., 14 Stafford Terrace, Kensington, W.8. (Orn.)
1948 Tate, P., Sunnyhill, The Clump, Rickmansworth, Herts. (Orn.)
1946 Taylor, G., 9 Belsize Crescent, Hampstead, N.W.3. (Orn.)
1946 Taylor, J. E., 66 Endwell Road, S.E.4. (Orn.)
1946 Taylor, J. M., 153 Northumberland Road, North Harrow, Middx. (Orn.)
1949 Taylor Miss L. L., 38 Victoria Drive, Wimbledon Common, S.W.19. (Bot., Orn., R.)
1947 Taylor, S. F., 6 Westbourne Road, Hillingdon, Middx. (Orn.)
1945 Teagle, W. G., 20 Wendover Road, Harlesden, N.W.10. (Arch., Orn.)
1947 Tearnan, L. C., 7 Greystoke Gardens, Enfield, Middx. (Orn.)
1920 Thomas, Mrs G. E., 9 Talbot Road, Isleworth, Middlesex. (Orn., R.)
1947 Thompson, A. G. G., 139 Highlands Heath, S.W.15. (Ecol., Orn.)
1945 Thompson, A. J. B., 218 The Headlands, Northampton. (Orn.)
1948 Thompson, H. V., 13 Holders Hill Drive, Hendon, N.W.4. (Mam.)
1948 Thomson, K. D. B., 76 Brondesbury Road, Kilburn, N.W.6. (Orn.)
1945 Thomson, W. W., M.B., Ch.B., 51 Norbury Court Road, S.W.16. (Orn.)
1946 Thornton, J. O., Southdown Hall Hotel, The Downs, S.W.20. (Orn.)
1947 Thorstensen, B. J., 6 Spencer Hill, Wimbledon, S.W.19. (Arch., Ecol.)
1944 Thrupp, Miss B., B.A., P.A.S.I., 39 Mitcham Park, Mitcham, Surrey. (Bot., Orn).
1947 Timson, Mrs M. H., 85 Dollis Hill Avenue, Cricklewood, N.W.2. (Geol.)
1947 Timson, P. F., B.Sc., A.R.I.C., 85 Dollis Hill Avenue, Cricklewood, N.W.2. (Geol.)
1945 Titmas, Miss M., 479 Kensington Close, Wrights Lane, W.8. (Orn.)
1932 Todd, Miss G. E., 1 Orme Court, Bayswater Road, W.2. (Bot., Orn., R.)
1945 Toombs, H. A., British Museum (Natural History), Cromwell Road, S.W.7. (Bot., Geol., Orn.)
1947 Toombs, Miss M. Address not known.
1949 Toop, B. M., White Lodge, Enfield, Middx. (Orn.)

1949 Toop, Mrs N. M., White Lodge, Enfield, Middx. (Orn.)
1946 Tourelle, Miss M. D., 38 Ismailia Road, Forest Gate, E.7.
1947 Towle, Dr D. D., M.B., B.Ch., B.A., 63 Wellmeadow Road, Hither Green, S.E.13. (Arch., Micr., Mycol.)
1892 Tremayne, L. J., F.Z.S., Grand Buildings, Trafalgar Square, W.C.2. (Arch., Bot., Lep., Orn., Pl. G., R.)
1940 Tucker, A. V., St Anne's, Bathurst Walk, Iver, Bucks. (Orn.)
1935 Tucker, D. G., Ph.D., 47 First Avenue, Amersham, Bucks. (Ecol., Orn.)
1946 Tuke, Miss E. M., Goldsmiths' College, New Cross, S.E.14. (Geol.)
1947 Turner, C. F., 24 Chesham Road, Anerley, S.E.20. (Orn.)
1931 Underwood, R. A., Greenways, Shoreham Road, Otford, Kent. (Orn.)
1937 Upton, Mrs P. V., M.B.O.U., Park Lodge, Margaretting, Essex. (Orn.)
1929 Venour, Miss D., Offley Place, Great Offley, Hitchin, Herts. (Ecol., Orn.)
1949 Verdon, Miss M., Little Bede, Clavering, near Saffron Walden, Essex. (Bot., Orn.)
1946 Vernon, R. M., 33 Temple Avenue, Shirley, Croydon, Surrey. (Orn.)
1948 Versteegh, Miss M. E., 2 Ravenscroft Avenue, N.W.11. (Ent.)
1933 Vincent, W. G., 154 Winchester Road, Hale End, E.4. (Orn.)
1946 Wadley, N. J. P., 23 Beauchamp Place, S.W.3. (Orn.)
1949 Waghorn, Miss E., 68 Whitcher Street, New Cross, S.E.14. (Orn.)
1948 Wall, G. L., "Hafod," Merstham, Surrey. (Ent., Orn.)
1947 Wallace, E. C., 2 Stratbearn Road, Sutton, Surrey. (Bot., Bryol., Ecol.)
1927 Waller, G., 158 Beckenham Road Beckenham, Kent. (Ecol., Ent., Orn.)
1944 Walshe, Miss B. M., M.Sc., 27 Sussex Place, N.W.1. (Bot., Fr. Water Ecol., Orn.)
1946 Walter, C. N., 32 Stanley Avenue, Beckenham, Kent. (Orn.)
1946 Walter, Mrs V., 32 Stanley Avenue, Beckenham, Kent. (Orn.)
1947 Walton, F., 50 Fletching Road, Clapton, E.5. (Bot.)
1938 Warburg, G. O., 1 Woodside, Erskine Hill, N.W.11. (Orn.)
1943 Ward, Mrs A., 13 Chatham Road, E.17.
1925 Ward, B. T., 24 Long Deacon Road, E.4. (Bot., Ecol., Ent., Orn., Pl. G., R.)
1947 Ward, F. A. B., M.A., Ph.D., 11 The Close, Southgate, N.14. (Arch., Orn.)
1933 Ward, Miss I. W., 11 The Close, Southgate, N.14.
1943 Ward, Miss M., B.Sc., 13 Chatham Road, E.17.
1933 Ward, Miss M., M.B., Ch.B., Threeways, Jordans, Beaconsfield, Bucks. (Arch., Orn.)
1943 Ward, R. S., 86 Parkside Drive, Watford, Herts. (Bot., Ecol., Orn.)
1948 Ward, W. H. C., 54 Woodfield Road, Leigh-on-Sea, Essex.
1948 Warmington, Prof. E. H., M.A., F.R.Hist.S., 48 Flower Lane, Mill Hill, N.W.7. (Bot., Orn.)
1946 Warren, R. B., 38 Athelstan Road, Harold Wood, Romford, Essex. (Orn.)
1947 Waters, F. H., "Korcula," Riverside Close, Staines, Middx. (Orn.)
1942 Watt, Mrs E. C., 13 Park Road, N.W.1. (Orn.)
1925 *Watt, Mrs W. Boyd, M.B.O.U., 39 Christchurch Road, Bournemouth, Hants. (Arch., Ecol., Orn.)
1938 *Wattson, Miss A. E., 43 Salisbury Road, Worcester Park, Surrey. (Ent., Orn.)
1939 Wattson, R. F., 43 Salisbury Road, Worcester Park, Surrey. (Ent.)
1939 Wattson, Mrs R. F., 43 Salisbury Road, Worcester Park, Surrey.
1946 Weal, R. D., 124 Marmion Avenue, South Chingford, E.4. (Ent.)
1928 Weeks, C., 7 Ashmount Road, Hornsey Lane, N.19. (Ecol., Orn., R.)
1945 Weibel, A., "The Ramblers," 19 Berwyn Road, Richmond, Surrey. (Ent., Orn.)
1946 Weitzel, D. O., 13 Hereford Road, Ealing, W.5.
1944 Welch, Mrs B., 49 Lichfield Court, Richmond, Surrey. (Bot., Geol.)
1939 Welford, Miss A. M., 13 Clifton Avenue, N.3. (Orn.)
1947 Werth, Miss I., Department of Zoology, Queen Mary College, Mile End Road, E.1. (Geol., Orn.)
1949 Westall, P. R., M.B., B.Ch., 51 St Mary's Mansions, W.2. (Orn.)
1949 Whatton, Miss J. D., 5 Bloomfield Terrace, S.W.1. (Orn.)
1948 Wheeler, A. W., 156 Bridgewood Road, Worcester Park, Surrey. (Orn.)
1935 Whitaker, F. O., 51 Grosvenor Avenue, Carshalton. (Bot., Ecol., Pl. G., R.)

1944 Whitaker, Miss M. B., B.Sc., F.Z.S., 264 Grange Road, S.E.19. (Zoo.)
1932 Whitbread, Miss W. H. E., 6 Meadow Way, Weald Village, Harrow, Middx.
1947 White, A. H., 76 Newstead Avenue, Orpington, Kent. (Orn.)
1937 White, C. A., 18 Townsend Road, Southall, Middx. (Orn.)
1949 White, R., 2 Norwood Terrace, Norwood Green, Southall, Middx. (Orn.)
1949 Whitehouse, Mrs M., 16 Ranelagh Avenue, Barnes, S.W.13. (Bot.)
1946 Whittingham D. M., 32 Thornhill Road, Ickenham, Middx. (Orn.)
1947 Whitton, Mrs J. S., Sandcroft, The Green, Esher, Surrey. (Orn.)
1934 Wightman, J. S. Address not known. (Orn.)
1938 Wigzell, J. A., 17 Wool Road, S.W.20. (Ecol., Orn.)
1942 Wilkinson J. S., B.A., A.C.A., 26 Golders Rise, N.W.4. (Bot.)
1946 Willett, Miss N. M., 68 College Road, West Dulwich, S.E.21. (Bot., Orn.)
1948 Williams, A., Flat 22, 17 Stratton Street, W.1. (Bot., Ent., Orn.)
1949 Williams, R. W., 79 Grierson Road, Honor Oak Park, S.E.23. (Geol., Orn.)
1948 Williamson, Miss M. S., 29 Hanover House, Regent's Park, N.W.8. (Arch., Orn.)
1948 Willoughby, Miss P., 27 Queen's Gate Mews, S.W.7. (Orn.)
1946 Wilsher, W. G. Address not known. (Arch., Orn.)
1942 Wilson, D. S., 5 Lawrence Road, South Norwood, S.E.23. (Orn.)
1949 Wilson, Miss E. A., 21 Alwyn Avenue, Chiswick, W.4. (Orn.)
1938 Wilton, A. R., 262 Kingston Road, S.W.20. (Ecol., Orn., R.)
1946 Wimble, L. H., 10 Broadoaks Way, Bromley, Kent. (Orn.)
1948 Wince, Dr W. H. D., 70 Warham Road, Harrow Weald, Middx. (Ent., Orn.)
1938 Winsloe, Mrs C. M., c/o Lloyds Bank Ltd., 18 Wigmore Street, W.1. (Orn.)
1948 Wise, A. J., The Maples, Daryngton Drive, Merrow, Guildford, Surrey. (Orn., Zoo.)
1948 Wolfe-Murray, Lt.-Col. D. K., 239 Ware Road, Hertford, Herts.
1942 Wood, B., Vincent's Shaw, Chipstead, Surrey. (Orn.)
1948 Wood, D. N., 5 Oulton Crescent, Potter's Bar, Middx. (Astronomy, Orn.)
1944 Woolner, H. C., 6 Cunningham Avenue, St Albans, Herts. (Orn.)
1948 Wortley, Miss P. J., "Collingham," 3 Burlescoombe Leas, Thorpe Bay, Essex. (Orn.)
1946 Wraight, F., Onslow Court Hotel, Queen's Gate, S.W.7. (Orn.)
1946 Wraight, Mrs W. A., Onslow Court Hotel, Queen's Gate, S.W.7. (Orn.)
1945 Wright, J. V., 55 Links Road, Ashtead, Surrey.
1945 Wrighton, F. E., 108 Manor Way, Ruislip, Middx. (Bot.)
1937 Yarrow, I. H. H., M.A., Ph.D., D.I.C., F.R.E.S., N.A.A.S., University College of South Wales, Cardiff. (Ecol., Ent.)
1946 Young, Miss C. M. Address not known. (Bot., Orn.)
1947 Young, H. R. M., 16 Streatham Close, Leigham Court Road, Streatham, S.W.16. (Col., Conch., Geol., Lep.)
1949 Young, R. H. D., 299 Woodstock Road, Oxford. (Orn.)

Affiliated Societies:

1949 Borough Road College Natural History Society (Hon. Secretary, D. A. E. Cross), Borough Road College, Isleworth, Middx.
1949 The British Council, Student Welfare Department, 3 Hanover Street, W.1.
1949 Sir George Monoux Grammar School, Chingford Road, Walthamstow, E.17.
1949 Haberdashers' (Aske's) Hampstead School, Biological Society, Westbere Road, N.W.2. (Bot.)
1947 Mill Hill School Natural History Society (President, D. M. Hall), Mill Hill School, N.W.7.
1936 Tiffin Boys' School Scientific Society (Natural Science Section) (D. T. Humphris), Tiffin Boys' School, Kingston-on-Thames, Surrey. (Ecol.)
1948 Universities Federation for Animal Welfare, 284 Regent's Park Road, Finchley, N.3.

Branch Associates:

1949 Bacon, Miss M. J., 127 Collinwood Gardens, Ilford, Essex. (Lep., Orn.)
1945 Baker, C. E., 25 Spareleaze Hill, Loughton, Essex. (Orn.)
1945 Barton, Miss P., 3 Howard Road, Church Hill, E.17.
1943 Beavis, G. H. S., 14 Fairlight Avenue E.4.

1925 Boardman, S., 109 Monkham's Avenue, Woodford Green, Essex. (Mycol., Orn.)
1948 Burling, Mrs M. T., Holy Trinity Vicarage, South Woodford, E.18. (Orn.)
1938 Chingford Branch County Library (E. Leyland, Librarian), Hall Lane, E.4.
1947 Chingford County High School Natural Science Society, County High School, Nevin Drive, Chingford. E.4.
1946 Day, G., 3 Ingatestone Road, Woodford Green, Essex. (Orn.)
1943 Dossetter, L. J., 11 York Road, E.17. (Orn.)
1947 Forster, H. W., 76 Station Road, Chingford, E.4. (Col.)
1946 Harris, A. G. B., 7 The Bramblings, Chingford, Essex. (Orn.)
1920 Hart, Miss H., 7 Park Hill Road, E.4.
1944 Hassell, Miss S. M., 75 Derby Road, E.18. (Bot.)
1933 Hayward, P. D., 2 King's Green, Loughton, Essex. (Orn.)
1948 Huxtable, R., 34 Mount View Road, Chingford, E.4.
1948 Jones, Miss J., 28 Elm Park Avenue, N.15. (Bot., Orn.)
1911 Mathieson, Miss M. L., 7 Crescent Road, E.4. (Meteorology)
1934 Nicholson, E. T., 21 Holly Drive, E.4. (Ecol., Orn.)
1945 Patterson, P. J., 7 Cecil Road, Walthamstow, E.17. (Ent.)
1930 Penwarden, Miss C. Address not known.
1927 Pettit, S., 2 Victoria Road, E.4.
1927 Pettit, Mrs S., 2 Victoria Road, E.4.
1948 Pratt, C. B., 1 West Ham Lane, Stratford, E.15. (Lep.)
1944 Rattenbury, D. C., 9 Ingatestone Road, Woodford Green, Essex. (Lep.)
1943 Richter, Mrs F. G., 32 Pretoria Road, E.4.
1942 Rumsey, P. F. C., Park Farm Nursery, Sewardstone Road, E.4. (Orn.)
1946 St Egbert's College Natural History Society (Secretary, J. S. Keyes), Chantry, The Ridgeway, Chingford, E.4. (Bot., Orn.)
1925 Saul, H. J. B., 12 Sandringham Court, Ipswich Road, Norwich.
1948 Shaw, D., 41 Courtland Avenue, Chingford, E.4. (Arch., Geol.)
1943 Spink, H. J., 26 Holly Drive, E.4.
1903 Stevenson, H. E., F.C.S., 290 Fir Tree Road, Epsom Downs, Surrey. (Chem.)
1945 Tucker, Mrs D. G., 47 First Avenue, Amersham, Bucks.
1942 Tucker, Mrs F., 31 Frederica Road, E.4.
1942 Tucker, J. F., B.Sc., 31 Frederica Road, E.4. (Bot.)
1942 Turner, Mrs L., 202 The Avenue, Higham's Park, E.4. (Orn.)
1944 Vere, D. W., 119 Grosvenor Gardens, Woodford Green, Essex. (Ent.)
1942 Walker, C. H., St Bartholomew's Hospital, W. Smithfield, E.C.1. (Orn.)
1944 Watson, Miss L. D., 9 Richmond Avenue, Highams Park, E.4.
1942 Wheeler, A. C., 17 Neven Drive, E.4.
1944 Wiles, H., Mapledene, Alderton Hill, Loughton, Essex.

Country and School Associates:

1928 Alexander, O. A., Wayside Cottage, Assheton Road, Beaconsfield, Bucks. (Ent.)
1945 Ashburner, Miss M., General Hospital, Rochford, Essex. (Orn.)
1948 Bannister, H. E., The Moorings, Felden, Boxmoor, Herts. (Bot., Orn.)
1948 Basden, E. B., Mortonhall House, Liberton, Edinburgh, 9. (Bot., Ent., Geol.)
1946 Bennett, R. J., 64 Mount View, Moneyhill, near Rickmansworth, Herts. (Orn.)
1931 Benson, Mrs R. B., Dellfield, Featherbed Lane, Felden, Herts. (Bot., Orn., R.)
1947 Betchley, D. W., B.A., 60 Goldcroft Avenue, Weymouth, Dorset. (Lep., Orn.)
1943 Betteridge, H. W. G., 52 Newton Road, Tunbridge Wells, Kent.
1934 Biddlecombe, P. E., 30 Hill View Road, Orpington, Kent. (Arch.)
1949 Boddy, B., 488 Upper Richmond Road, Richmond, Surrey. (Ent., Orn.)
1937 Bond, Mrs M. T., 25 Reedway, Northampton. (Orn.)
1908 Bostock, E. D., 8 Pelham Gardens, Folkestone, Kent. (Lep.)
1949 Broughton, Miss J. L., Bryn Estyn, Russell Road, Rhyl, Flintshire, N. Wales. (Orn.)
1937 Bunker, H. E., 18 Abingdon Drive, Ashton, Preston, Lancs.
1936 Cawkell, Major E. M., Old Hollow, Mere, Wilts. (Orn.)

1948 Chapman, G. M., Rosehill, Newton Abbot, Devon. (Orn.)
1948 Clarke, R. J., Mera House, Massetts Road, Horley, Surrey. (Orn.)
1937 Cockburn, T. A., M.D., c/o Bank of Montreal, Edmonton, Alberta, Canada. (Orn.)
1933 Collett, G. W., 174 Sheldon Road, Chippenham, Wilts. (Bot., Ecol., Orn., R.)
1946 Collins, L. A., Rose Cottage, Alfriston, Sussex. (Orn.)
1936 Colyer, W. L., Heybrook, Connaught Road, Sidmouth, Devon. (Ecol., Orn.)
1947 Crawford, J. R., 151 Atkinson Road, Fulwell, Sunderland, Co. Durham. (Orn.)
1933 Darashah, Mrs E. G., 108 Stephens Road, Tunbridge Wells, Kent. (Arch., Bot., R.)
1945 Dorée, Dr Charles, Longroof, Hervines Road, Amersham, Bucks. (Ent., Orn.)
1949 Duck, B. E., 1 Clydesdale Gardens, Richmond, Surrey. (Orn.)
1949 Elliott, Miss D. M., The Rectory, Belbridge, Co. Kildare, Eire. (Orn.)
1949 Eveling, Miss M., 6 Dapdune Crescent, Guildford, Surrey. (Orn.)
1940 Fairbairn, D. C., M.C., M.B., B.Sc., L.R.C.P., M.R.C.S., 1 St Mary's Grove, Queen's Ride, S.W.13. (Bot.)
1935 Farquharson, A., Le Play House, Albert Road, Malvern. (Ecol.)
1933 Ferrier, Miss J. M., F.Z.S., M.B.O.U., A.A.O.U., Blakeney Downs, Blakeney, Norfolk. (Ecol., Orn.)
1947 Fillmore, L. J., 11 Westfield Avenue, Woking, Surrey. (Orn.)
1947 Fillmore, Mrs N., 11 Westfield Avenue, Woking, Surrey. (Orn.)
1949 Fincher, F., Randan Wood, Woodcote, Bromsgrove, Worcs. (Bot., Ecol., Ent., Orn., Zoo.)
1933 Gibson, Miss E. M., Ashcroft, Station Road, Petersfield, Hants. (Lep., Orn.)
1944 Gladstone, Sir H. S., Capenoch, Penpont, Dumfries. (Orn.)
1947 Godfray, Miss M., 127 Norcot Road, Tilehurst, Reading, Berks. (Orn.)
1934 Godwin, C., Canonbury, Somerton, Oxford. (Orn.)
1934 Godwin, Mrs M. L., Canonbury, Somerton, Oxford. (Orn.)
1937 Green, D. B., Church Cottage, Church Hanborough, Oxon. (Orn.)
1937 Guichard, K. M., c/o Westminster Bank, Ltd., 185 Haverstock Hill, N.W.3. (Bot., Ecol., Ent., R.)
1945 Gurteen, F. M., Honiley, Balcombe Road, Horley, Surrey. (Bot., Orn.)
1944 Hager, Miss P. D., Langdale, Ashlyns Road, Berkhamsted, Herts. (Orn.)
1948 Hall, E. T., Court House Cottage, Winchelsea, Sussex. (Orn.)
1948 Harley, B. H., Peterley Corner, Prestwood, Gt. Missenden, Bucks. (Lep., Mam., Orn.)
1935 Harris, A. H., " Silton," Loughborough Road, Ruddington, Notts. (Orn.)
1944 Harrison, R., Radfield, Kingsland, Shrewsbury. (Mycol., Orn.)
1927 Harvey, J. H., Half Moon Cottage, Little Bookham, Surrey. (Bot.)
1939 Haviland, Miss D. M., c/o Miss Campbell of Kilberry, Tarbert, Loch Fyne, Argyll, Scotland. (Orn.)
1937 Hayward, H. H. S., Jessamine House, King Street, Tring, Herts. (Orn.)
1947 Hearne, T. F. B., 7 Orchard Grove, Maidenhead, Berks. (Orn.)
1947 Hebditch, G. A., 92 Rydes Hill Road, Guildford, Surrey. (Orn.)
1930 Hopkins, G., 51 Sandy Lodge Way, Northwood, Middx. (Ecol., Orn.)
1948 Jermyn, S. T., 45 Highfield Gardens, Westcliff-on-Sea, Essex. (Bot.)
1947 Johnson, Miss E. M. C., Wychwood, Eastbourne Road, Godstone, Surrey. (Orn.)
1948 Knight, G. R., c/o Hardie, 7 Wellington Street, Edinburgh, 7. (Pl. G.)
1936 Lamont, Mrs E. H., Marshalls, Chart Sutton, Maidstone, Kent. (Orn.)
1942 Law, Miss M. D. L., 19 Fengates Road, Redhill, Surrey. (Arch., Ecol.)
1935 Leatherdale, Capt. D., F.R.E.S., F.R.G.S., M.R.C.A.S., Tasli, Hawks Hill, Leatherhead, Surrey. (Bot., Ent., Geol., Pl. G., R.)
1936 Lewis, Miss M., Brincliffe, Osney Crescent, Paignton, S. Devon. (Arch., Bot., Ecol., Ent., Orn., R.)
1941 Lisney, A. A., M.A., M.D., F.R.E.S., 66 Monmouth Road, Dorchester, Dorset. (Lep.)
1938 Lowe, Miss C. B. M., c/o Coutts & Co., 440 Strand, W.C.2. (Arch., Bot., Orn., R.)
1943 Lusty, E. J., c/o 83 Snakes Lane, Woodford Green, Essex. (Orn.)

1932 Mason, C. T., Mill Cottage, Gt. Shefford, Newbury, Berks. (Arch., Ent.)
1945 Maxwell, J. E. H., 78b Clare Road, Maidenhead. (Orn.)
1947 Maynard, T. R., 21 Pelham Square, Brighton, Sussex. (Orn.)
1947 Mitchell. K. D. G., 11 Beeston Grove, Grassendale, Liverpool, 19. (Orn.)
1947 Moodie, Mrs D. M. F., Ragusa, Blundel Lane, Stoke D'Abernon, Cobham, Surrey. (Orn.)
1942 Moorhouse, S., Lyndale, Orchard Avenue, Bolton-le-Sands, Lancs. (Orn.)
1934 Morgan, D. A. T., Corner Cottage, Sheering, Bishop's Stortford, Herts. (Ecol., Orn., R.)
1938 Muirhead, D., Malvern House, The Baulk, Worksop, Notts. (Ecol., Orn.)
1934 Norris, C. A., M.B.O.U., 10 Warwick Road, Stratford-on-Avon, Warwickshire. (Ecol., Orn.)
1948 Ounsted, J., M.A., Mark Ash, 116 Shinfield Road, Reading, Berks. (Bot., esp. vascular flora, Bryol., Mycol., Orn.)
1946 Parrott, R. T., 15 Barnfield Avenue, Shirley, Croydon, Surrey. (Orn.)
1929 Perry, Mrs M. D., 37 MacAlister Street, Mackay, Queensland. (Orn., R.)
1935 Pettit, H. A., Spring Valley Mill, Ardleigh, Essex. (Ent., Orn.)
1897 Pike, Oliver G., F.Z.S., M.B.O.U., F.R.P.S., The Bungalow, Leighton Buzzard, Beds. (Orn.)
1949 Pomeroy, D. E., 11 Monk's Orchard Road, Beckenham, Kent. (Orn.)
1946 Pomeroy, Miss F. A., B.Sc., 110 Pembury Rd., Tonbridge, Kent. (Arch., Bot.)
1946 Rabbets, A. J., "Ashford," Luciefelde Road, Shrewsbury, Salop. (Orn.)
1940 Richardson, R. A., Gordon House, Cromer Road, Aylsham, Norfolk. (Orn.)
1941 Robbins, Rev. R. A., Avebury Vicarage, Marlborough, Wilts. (Arch., Bot.)
1946 Rose, F., B.Sc., A.L.S., The Forge House, East Malling, Kent. (Bot.)
1947 Sharland, R. E., Shillong, Beach Avenue, Barton-on-Sea, Hants. (Orn.)
1940 Sladen, W. J. L., M.B.E., M.B., B.S., Medical School, Middlesex Hospital, W.1. (Bot., Ecol., Ent., Orn.)
1940 Smeed, J. A., Zermatt, 1st Floor Flat, 35 St Anne's Road, Eastbourne, Sussex.
1946 Smith, H. J. F., Pollingfold, Ockley, Surrey. (Orn.)
1937 Spicer, A. H., M.C., M.R.C.S., L.R.C.P., Graffham, Petworth, Sussex. (Orn.)
1928 Talbot, G., F.R.E.S., 31 York Road, Woking, Surrey. (Lep.)
1943 Taylor. J. S., M.A., D.I.C., F.R.E.S., P.O. Box 23, Fort Beaufort, C.P., South Africa (Ent., Orn.)
1949 Tringham, R. W., 160 Elmstead Avenue, Wembley Park, Middx. (Orn.)
1944 Turner, D. H., c/o Mrs Ridsdale, Woodwards Farm, Balcombe, Sussex. (Orn.)
1935 Van Oostveen, Miss M. S., Flatford Mill, East Bergholt, Colchester, Essex. (Ecol., Ent., Orn.)
1949 Waylen, Miss J., Nursteed House, Devizes, Wilts.
1947 Weatherhead, Miss L. M., 7 Kingsgate Avenue, Finchley, N.3. (Orn.)
1945 Whellan, J. A., Division of Entomology, Department of Agriculture, P.O. Box 387, Salisbury, S. Rhodesia.
1947 Whicher, D. S., The Cottage, Clarence Street, Herne Bay, Kent. (Orn.)
1933 White, E. I., D.Sc., Ph.D., F.G.S., 140 Westwood Road, Tilehurst, Reading. Berks. (Orn., Palaeontology)
1944 Willcox, Mrs I. G., Huntercombe Manor, near Taplow, Bucks. (Ent., Orn.)
1948 Williams. E. D., Christ's College, Cambridge. (Orn.)
1949 Witcomb, Miss G., Dunhevid, Grosvenor Gardens, Aldwick, Bognor Regis, Sussex. (Ent., Orn.)
1949 Yeo, P F., Queen's College, Cambridge. (Bot., Ent., Orn.)
The Director, Royal Botanic Gardens, Kew, Surrey.

The following abbreviations are used in the above list of members :—Amph., Amphibia; Api., Apiculture; Arch., Archaeology; Biol., Biology; Bot., Botany; Bryol., Bryology; Chem., Chemistry; Col., Coleoptera; Conch., Conchology; Dipt., Diptera; Ecol., Ecology; Ent., Entomology; Geol., Geology; Hym., Hymenoptera; Icht., Ichthyology; Lep., Lepidoptera; Mam., Mammalia; Micr., Microscopy; Mycol., Mycology; Orn., Ornithology; Orth., Orthoptera; Pl. G., Plant Galls; P.L., Pond Life; R., Ramblers' Section; Rep., Reptilia; Zoo., Zoology.

* Signifies a Life Member.

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LONDON NATURAL HISTORY SOCIETY.

THE Society is an amalgamation of the City of London Entomological and Natural History Society, founded in 1858, and the North London Natural History Society, founded in 1892.

Meetings are held on Tuesday evenings, either at the London School of Hygiene and Tropical Medicine, Keppel Street, Gower Street, W.C.1, or at the Hall of the Art-Workers' Guild, Queen Square, W.C.1. The half-yearly syllabus should be consulted as to the venue of any particular meeting. The room is open from 6 p.m. to 9 p.m., and meetings begin punctually at 6.30 p.m. and end about 8.30 p.m., unless other arrangements are announced. The Library and Collections are available to members after meetings at the School of Hygiene.

The **Chingford Local Branch** meets at the Geography Room, County High School, Nevin Drive, Chingford, at 2.45 p.m., on the first Saturday in each month during the winter months.

At all indoor meetings specimens of Natural History interest are exhibited, and papers on various subjects are read and discussed. Visitors may be introduced by members of the Society, and are cordially welcome. Frequent field meetings are held at week-ends, particulars of which are contained in the syllabus.

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Each member and associate is entitled to one copy of *The London Naturalist* and *The London Bird Report* free; extra copies may be purchased by members, if supplies are available, at two-thirds of the published price.

Further information and syllabus may be obtained from the General Secretary:—**H. A. TOOMBS, Dept. of Geology, British Museum (Natural History), Cromwell Road, S.W.7.**

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